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Dissertation

AN EXPERIMENTAL TECHNIQUE FOR THE DETERMINATION OF PERSONALITY DIFFERENCES AS REVEALED IN PERCEPTUAL FUNCTIONS OF NORMAL SUBJECTS AND PSYCHIATRIC PATIENTS.

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Introduction.

The practical and theoretical significance of any technique which allows us to detect rapidly some of the fundamental features of various personalities would hardly be questioned. The knowledge of personality is not only the chief task of scientific psychology, but our practical adjustment to our fellow men also depends to a significant extent on the knowledge of the special characteristics of other people's psychological make-up.

In our attempt to obtain such a knowledge we are handicapped not only by the tremendous complexity of personality organization, but also by the fact that only a few surface manifestations such as speech, gesture, etc. are accessible to direct observation while the incomparably larger and more significant elements of the total psychological structure are hidden from our eyes.

Not all outward manifestations are equally revealing of the internal structure of personality. One of the chief tasks for the student of personality is to detect manifestations which can be related to some essential features of personality and to devise techniques that allow to gauge through the surface manifestations the internal psychological structure of the person. This task is in many respects similar to that of a physician who has to diagnose a not

directly observable pathological condition through some of its observable external signs. This involves a technique of establishing a relationship between certain external features insignificant in themselves and the underlying internal conditions. An irregular pulse may be significant as a symptom of a bad heart, a particular skin texture a symptom of an endocrine condition.

A technique must fulfill certain requirements in order to become a useful tool for personality diagnosis. I will enumerate the requirements which seem most significant to me.

1) It is desirable that the sign to be used for diagnostic purposes should be such that it can be elicited experimentally. This criterion has several implications. One is economy of time. There are many revealing spontaneous manifestations of personality characteristics but it requires time, prolonged observation to detect them at their spontaneous appearance and to interpret them. In an experiment the diagnostic sign is produced at will, that is, one does not have to wait for its spontaneous appearance. The other advantage of experimental procedures is that they allow to a greater extent the control of variables that may influence the function in question.

2) The observable function which one desires to use as a symptom for personality diagnosis must be different

from person to person. The more general the phenomenon is, the less it contributes to our knowledge of that particular person. For instance, the tendency to avoid painful stimuli can easily be demonstrated practically in all persons, but it will contribute very little to our ability to distinguish one person from another. Statistically speaking the results of the psychodiagnostic test must be distributed over a rather wide range and separate one person from another or show definitely distinguishable types of reaction under which the persons examined fall.

3) The results obtained in one and the same person on different occasions must be rather consistent, otherwise it is doubtful whether the function measured is a more or less basic, permanent characteristic of the person. If the results are changeable, it is likely that they are the product of the momentary constellation of the internal and external situation, rather than representing permanent features of the person.

4) The personality feature that one detects through a special diagnostic device must be an important component of total personality structure. The function which serves as a diagnostic sign does not need to be significant _in itself_, but needs only to be definitely related to a personality characteristic of major importance.

What is meant here can be made clear by the parallel used before, namely the diagnostic procedure used by the physician. Such a bodily feature as paleness of the lips would not have any great medical significance in itself, namely if it would be just a variation of color. It gains medical significance, however, if it is considered as a symptom of a faulty circulatory function. Similarly, a minor individual variation of a perceptual function has only a slight psychological significance in itself. It gains importance, however, if it can be related to some fundamental personality trait. Then it becomes the symptom of that trait.

5) Finally I wish to mention one criterion which is related to that just mentioned. It is a distinct advantage whenever a rather "peripheral", impersonal function can be used as a symptom for the detection of important personality traits. In such a case the test does not provoke the defensive mechanisms in the person, because the experiment appears to him innocuous. The more the person is aware that significant personality traits are tested the more likely it is that the results will be distorted both consciously and through unconscious defense mechanisms.

In this study I wish to report about a technique which seems to fulfill the above mentioned criteria thus promising to be useful for the detection of certain important personality traits.

The development of this technique originated with certain incidental observations which I made during the course of an exploratory study to measure the span of attention in psychotic and normal subjects. In that exploratory study, short time tachistoscopic exposures of simple letter combinations were used. I noticed at that time that each person tends to reproduce the tachistoscopically exposed letters in a manner characteristic for him. Furthermore it was noticed that schizophrenic patients reproduced the exposed letter combinations in a way which was in several respects different from that of nonpsychotic subjects. Finally, not only did the responses of schizophrenic patients seem to be markedly different from those of normal individuals, but there was also some indication that the tachistoscopic method revealed rather definite type differences within the schizophrenic group itself.

In order to follow up the leads of these incidental observations the experiments to be reported here were devised. At the beginning the main emphasis was placed on bringing out the differences between schizophrenic and nonpsychotic subjects, while later the emphasis was shifted to problems of personality diagnosis in various psychiatric conditions.

The study consists of two parts: 1) A comparative

study of schizophrenic and normal subjects, and 2) A study of a diagnostically heterogeneous group of patients of a large out-patient clinic.

Part I.

Comparison of the Test Results of Schizophrenic Patients and Normal Control Subjects.

I. METHOD

In this first phase of the experiment 49 schizophrenic patients and 31 normal control subjects, all males, were studied. The 49 patients included almost the entire population of the two wards of the Research Service of the Worcester State Hospital; only patients who did not cooperate were excluded. Other than this, no selection was made. The normal control subjects were taken at random from the standard normal control list of the Research Service, which consists of persons certified by the physicians as free from any gross mental or physical abnormality.

The experiments consisted in a short time exposure of various letter combinations. The cards which were used for exposure contained combinations of printed capital letters, four to six on each card. The following letters were used: B, C, D, F, H, J, K, L, M, N, P, R, S, T, V, W, X, Z. The letters were so combined that the groupings on the various cards were as different from one another as possible. The letters were printed at equal distances from each other inside the periphery of a circle having a diameter of 2.5 inches. The letters were in heavy type half an inch high.

Three series of 12 cards each were used. Each group

included 4 cards with 4 letters, 4 cards with 5 letters, and 4 cards with 6 letters. Thus in each session 60 letters were exposed, totaling 180 for the three sessions. The cards were presented in each session in the following order: 5, 4, 6, 6, 5, 4, 4, 5, 6, 5, 6, 4, according to the number of letters on a card. The third series was a combination of the first and of the second series, using the cards 1, 3, 5, 7, 9, and 11 of the first, and the cards 2, 4, 6, 8, 10, 12 of the second series. The time of exposure was 0.5 second. Each series of cards was presented to the subject during a separate session; the time lapse between sessions was on the average 1 to 3 days.

The exposures were made with the aid of a Dodge tachistoscope. This tachistoscope consists of two parts. The one is a wooden box measuring 22 by 22 by 9 inches. Left on the front side of the box a pair of goggles is fixed through which the subject can look into the inside of the box. The subject can see only a part of the inside, namely an alley 9 inches wide, 9 inches high and 22 inches deep which is brightly illuminated. Its far end is formed by a white background on which the exposed letter will flash up for a measured length of time. The rest of the box is occupied by a special light and mirror arrangement which allows the picture of the card to be thrown on the white surface visible to the subject.

The second part of the apparatus consists of a timing device which allows the picture to be exposed for exactly the desired length of time. I used a timing device specially designed by the Electronic Company. It can be regulated to give exposure times from 1/1000 of a second to 5 minutes. Actually, the present experiments could be carried out also with a much simpler and cheaper timing apparatus, because during the entire experimentation only 3 timings-- .5 second, 1 second, and rarely, .25 seconds--were used.

A blank card with a fixation point at the center was first exposed in the tachistoscope. The subject was instructed to look at the fixation point and to be attentive when the "ready" signal was given. He was told that immediately after the "ready" signal he would see some letters around the fixation point which he should write down immediately on a small paperblock placed on a small table in front and to the right of him. The subjects were instructed to write the letters not in a circle but in one row. The subject held the pencil ready for use before the exposure. The response to each exposure was written on a separate slip which was removed from the subject's sight as soon as the response was completed in order to avoid a possible influence on the next response.

In the first session a practice period was given first, in order to make the subject acquainted with the type of task.

To this end the first series of cards was exposed, using 1 second as the time of exposure. Then a period of rest of about 10 minutes was given, occupied with conversation unrelated to the experiment. After this the first series was again exposed using now the final 0.5 second period of exposures. In the second and third session, without any further practice period, the second and third series of cards respectively were exposed.[1]

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[1] In the exploratory phase of this study the impression was gained that the letters were almost completely forgotten a few seconds after exposure. It was thought that in this type of experiment very little learning takes place; hence it seemed justified to present the same series twice (in the first session) as well as to use as the third series a combination of series one and two. The final results did not justify this assumption. The effect of practice will be discussed in the presentation of the results.

II. RESULTS

A. Analysis of Errors

In reproducing the tachistoscopically exposed letters the subject may make two types of error: (1) He may reproduce fewer letters than have been exposed. Each letter not reproduced is counted as one error. This type of error will be called "omission." (2) The subject may report a letter which is different from the one shown to him. Such an erroneous response will be called "substitution," disregarding for the moment whether the letter given by the subject resembles closely, remotely, or not at all the original one. (3) The "total number of errors" is the sum of the omissions and substitutions.

1. The total number of errors. A comparison of the total number of errors for the two groups of subjects is given in Figure 1. The mean for the normal control group is 33.8, which is 19.2 per cent of the 180 letters presented in the three experimental sessions. The mean for the patients is 60.7, i.e., 35.7 per cent of the letters presented. The difference between the means of the two groups is statistically highly significant, the critical ratio being 6.6. One can say that in these experiments the normal subjects made on the average roughly 11 errors per session, while the schizophrenics made roughly 20 errors per session.

The frequency distribution of the patients has a

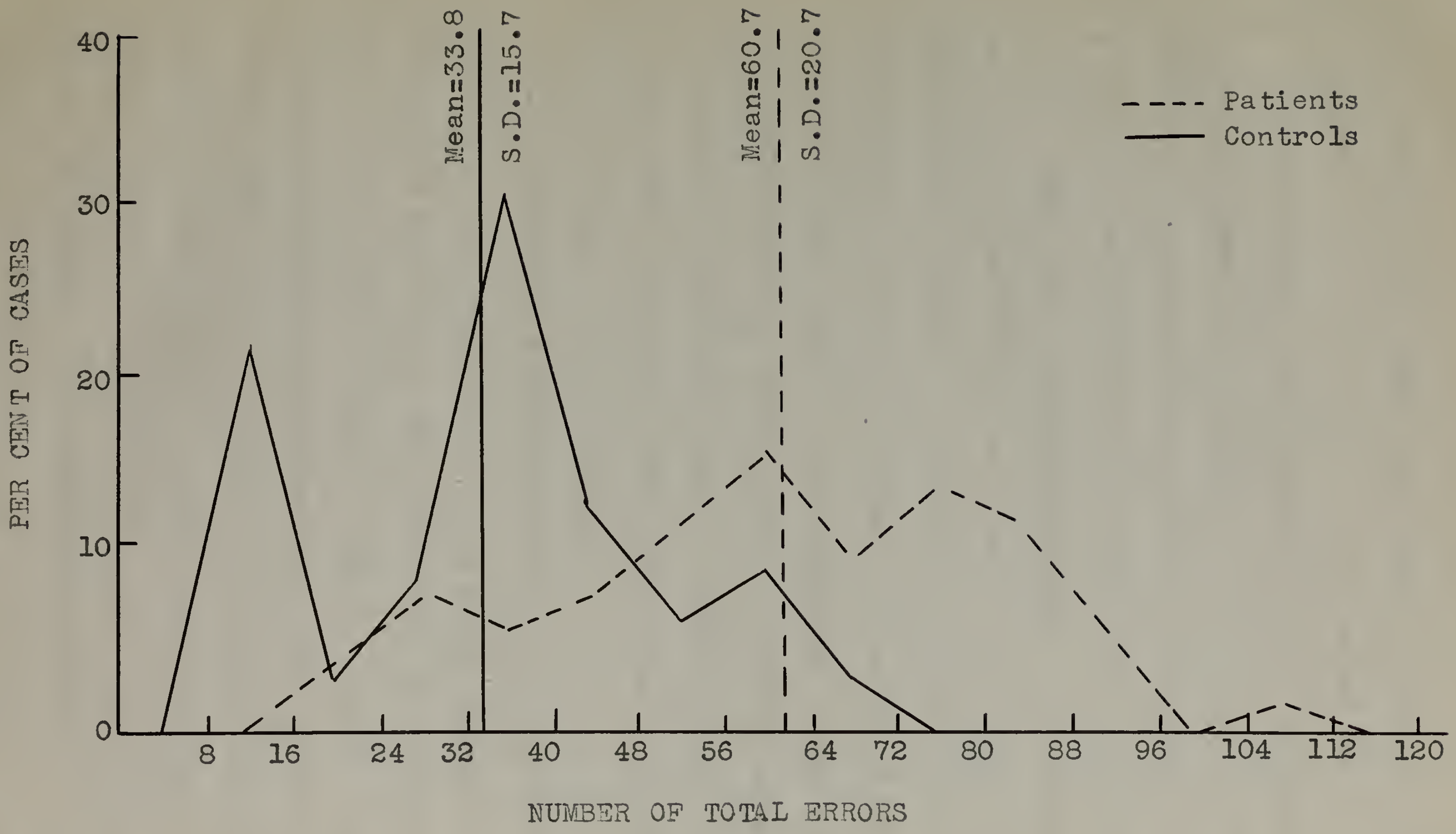


Figure 1
Frequency Distribution of Total Errors for 49 Schizophrenics and 31 Normal Controls

considerably wider range than that of the controls. Whether the bimodality in the curve of the normal control is indicative of true bimodality, or whether it is due to the smaller number of cases in this group, or finally, whether it is produced by an unrecognized error in sampling, is not clear. We will discuss this question again in a later section.

2. Omissions and substitutions. As mentioned above, the total number of errors is made up of omission and substitution errors. In order to be able to estimate the prevalence of the type of error, the ratio of omission errors to total errors (OE/TE) was calculated. High value of this ratio indicates high percentage of omission errors and consequently small percentage of substitutions; low value of this ratio indicates small percentage of omissions and high percentage of substitutions.

The frequency distribution of the ratio OE/TE is given in Figure 2. The group means for patients and normal controls are practically identical, this value for the patients being .702 and for the normal controls, .698. In other words, the errors of the schizophrenic patients as a group as well as the errors of the normal control subjects as a group consist on the average of 70% omissions and 30% substitutions. There is, however, a distinct difference in the distribution of values for the two groups. The remarkable feature of the distribution of the patients' values appears at the ends of the distribution

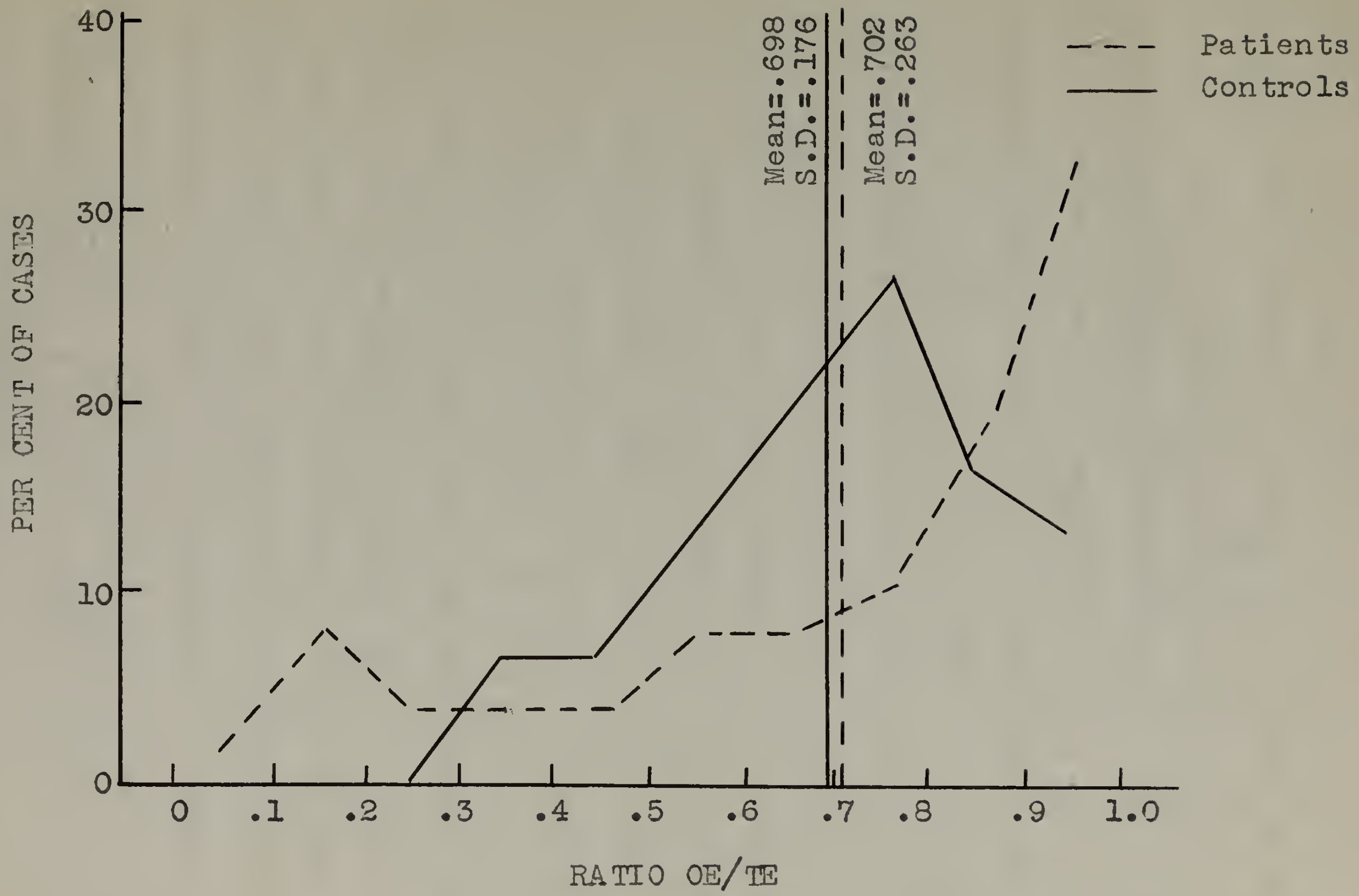


Figure 2

Frequency Distribution of the Ratios OE/TE for 31 Normal Controls and 49 Patients

curve. While in the control group the majority of cases fall in the middle ranges--as would be the case in a normal distribution--in the patient group the ends of the distribution are more markedly represented while the middle range of the curve tends to be somewhat concave. This is particularly evident at the upper end, but it is readily detectable also at the lower end. Thus 32.6 per cent of all patients have 99-100 per cent omission errors, while only 12.9 per cent of the controls have such extreme values. At the other end of the distribution there is a group of patients (14.3 per cent of the total) who have an unusually large percentage of substitution errors; their omission errors are less than 30 per cent of the total errors and consequently their substitution errors are more than 70 per cent. No subject in the normal control group has such an extreme value. Thus as far as the prevalence of omission or of substitution errors is concerned, there is emphasis on both extremes in the patient group. This type of distribution will gain additional significance in view of the data to be presented in a later section which will show that the same type of distribution was found also with regard to some of the other variables discussed in this paper.

The schizophrenic patients and the normal controls differ not only with regard to the relation of substitutions to omissions, but they also differ with regard to the absolute

number of substitutions. The average number of substitutions for the normal controls was found to be 3.2 and for the schizophrenics 5.7. These figures, however, do not represent precisely the facts. First of all, the values of the patients are distributed over a much wider range than those of the nonpsychotic control subjects. The values of the controls range from 0 to 11 substitutions per session; those of the schizophrenic subjects range from 0 to 27. Furthermore the calculated mean for the controls is more meaningful than that of the schizophrenics. The number of substitutions for the majority of the cases in the control group is around the mean value (3.2). Not so for the schizophrenic patients. There is a rather high number of patients who have very few substitutions or none; and again many patients have very high values. Thus the ends of the distribution are greatly emphasized, while the majority of cases by no means fall around the mean value of 5.7. Since this mean was obtained partly through blending into an average extremely high and extremely low values, it becomes somewhat meaningless. That is, it cannot be considered as "characteristic" for the schizophrenics as a group.

3. Common and uncommon substitution errors. Substitution was defined above as the reporting of a letter different from the one that was exposed to the subject. Substitution,

however, comprises a variety of considerably different errors. For one thing, the letter reported may resemble closely, remotely, or not at all the original letter; it is one matter to substitute a P for an R, and another to substitute a Z for an R.

An attempt was first made to divide the substitution errors into two broad categories: substitution of a similar and substitution of a dissimilar letter. The writer and another observer working independently divided the substitutions into two groups--similar and dissimilar. When, however, the divisions made by the two observers were compared, it appeared that there was considerable subjective element in the criterion of similarity of the two judges. Hence this method was discarded. The following empirical method was then chosen.

It seemed that even if a division into similar and dissimilar substitution may not reliably be made, a comparison of _common_ and _uncommon_ substitutions might be possible on the basis of the available data. If one assumes that our normal control group is a good sample of a nonpsychotic population, then one could use their substitution errors as a standard for comparison. For this reason, all such substitutions which occurred five or more times in the normal control group were considered as common, those which

occurred less than five times as uncommon. The following 12 substitutions, listed in order of the frequency of their occurrence, were found to be common in the control group:

Exposed	Reported	Exposed	Reported
(1) K	H	(7) B	S
(2) M	N	(8) N	M
(3) B	R	(9) X	H
(4) K	R	(10) X	V
(5) X	K	(11) W	M
(6) X	Z	(12) J	L

The question obviously arises whether or not in another unselected group the common substitutions would be identical with the list above; in other words, whether our control group is or is not a good and homogeneous sample of a nonpsychotic population with regard to the variable in question. The following method, although not beyond criticism, should be of some value for testing the sample. The total control group was divided into two equal groups, and the subjects in the two groups were matched so that the total number of substitution errors of these groups was very nearly equal, no attention being paid to the type of substitution in the two groups. It was reasoned that those types of

substitutions which occurred five or more times in the total control group ought to occur two or more times in each half of the group if one were justifiably to call them "common substitutions." The results of this analysis showed that all the 12 substitutions which were enumerated above fulfilled the criterion of this test. It was therefore felt that it is justifiable to consider these 12 varieties of substitution as "common" for a nonpsychotic group and to use them as standard for comparison.

The ratio of uncommon substitution to total substitution $\frac{(US)}{(TS)}$ was computed for each subject. Several subjects, however, did not make any substitutions. Furthermore, the significance of the ratio of uncommon to total substitution is of doubtful validity in cases where the number of total substitutions is very small. It was therefore decided to include in the calculation only those subjects who made 5 or more substitution errors. Thirty-seven patients and 23 controls fulfilled this requirement.

The frequency distribution of the ratios is plotted in Figure 3. From all substitution errors of the control group an average of 73.3 per cent is an uncommon substitution; an average of 86.6 per cent of the patients' substitutions is uncommon. This difference between the controls and the patients is statistically significant, the critical ratio being 3.9.

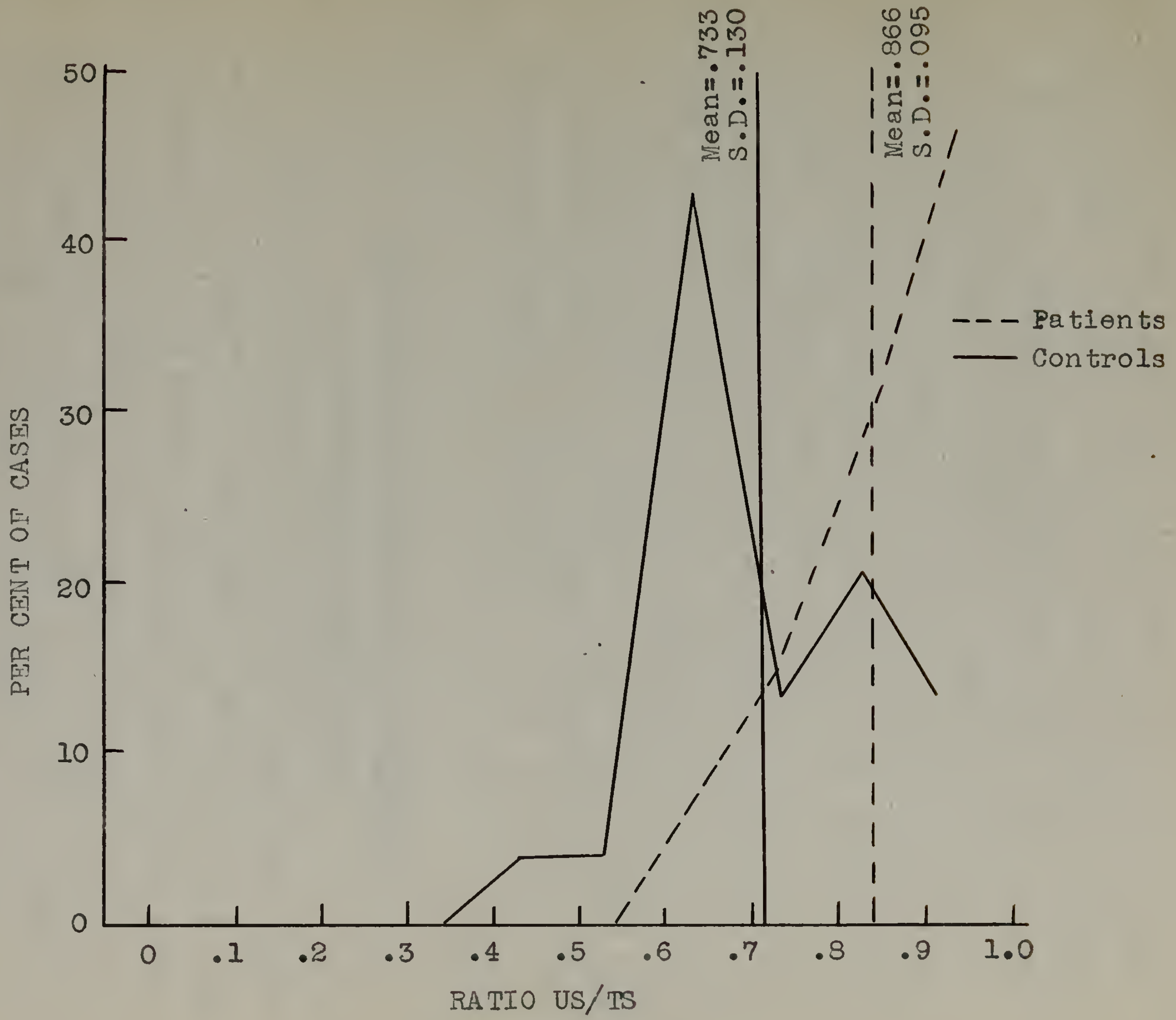


Figure 3
Frequency Distribution of the Ratios US/TS for 37 Schizophrenics and 23 Normal Controls

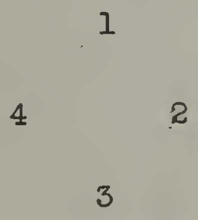
The term "uncommon substitution" may be somewhat misleading. First of all, the line of division between common and uncommon was arbitrarily set. More important to keep in mind is that what is common for the normal group may not be common for the patients, and vice versa: that is, the patients were measured by the standard of the normals. Therefore, all that the above figures show is that the patients substituted in a markedly different way than did the controls without indicating the nature of this difference. A closer analysis of the data involves a comparison of the visual Gestalt transformation in the two groups, and related problems.

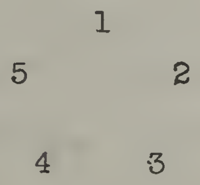
B. Individual Differences in the Methods of Tachistoscopic Perception.

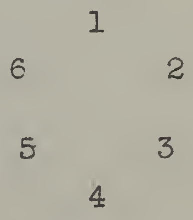
There are certain features of the responses obtained which are at least as informative as the number and types of errors. The subjects, particularly in the normal control group, tend to adhere to certain personally preferred modes of response. This is manifested in the two following ways: (1) they tend to reproduce the letters by starting with a personally preferred position, and (2) they perceive and reproduce the letters in a definite sequence and spatial order.

1. The initial letter. It may be recalled that in

these experiments the letters which were exposed tachistoscopically--4 or 5 or 6 on each card--were arranged in a circle. The following diagrams indicate the spatial arrangement of the letters on the cards; the various positions are numbered, arbitrarily calling No. 1 position the uppermost letter and numbering the other positions in a clockwise order.







The subject who starts with Position 1 tends to do so in all trials. Similarly, the subject who prefers the left upper position, that is, 4, 5, and 6 on the respective diagrams, tends to do so consistently. All other positions occurred as starting points on occasion but never as a preferred position except in the case of a paranoid patient who consistently started with the letter at the bottom--3, 4 or 3, and 4 on the respective diagrams.

No attempt has been made to determine the reasons for these personal preferences. It seemed, however, worthwhile to determine quantitatively how consistently a subject adhered to his personally preferred mode of response. The position with which the subject most frequently started was considered as being the preferred position. The ratio of

the number of responses in which he started with the preferred position to the total number of responses was taken to indicate the degree of self-consistency and was called the "letter consistency index."

The values of the index for both patients and controls are represented in Figure 4. The consistency is rather high for both groups, indicating that the habit in question is a firm one. The mean of the two groups is practically identical: .826 for the patients, .840 for the controls. The frequency distribution for the patients, however, is somewhat different from that of the normals. Thirty-six per cent of the patients have a consistency index below .80, while only 22.6 per cent of the normals fall in this lower range. At the upper end, 44 per cent of the patients have values which are above .90, whereas only 35.5 per cent of the control group have such high values.

The difference in the distribution of values of patients and controls is not striking. It gains, however, some significance, considering the fact that this type of distribution--namely greater frequency of extreme values in the schizophrenic group than in the nonpsychotic group--was found to exist in a more marked fashion with regard to two other variables: the ratio of omissions to total errors (Fig. 2) and, as will be shown below, with regard to the pattern consistency index.

2. The spatial pattern. The subjects not only start

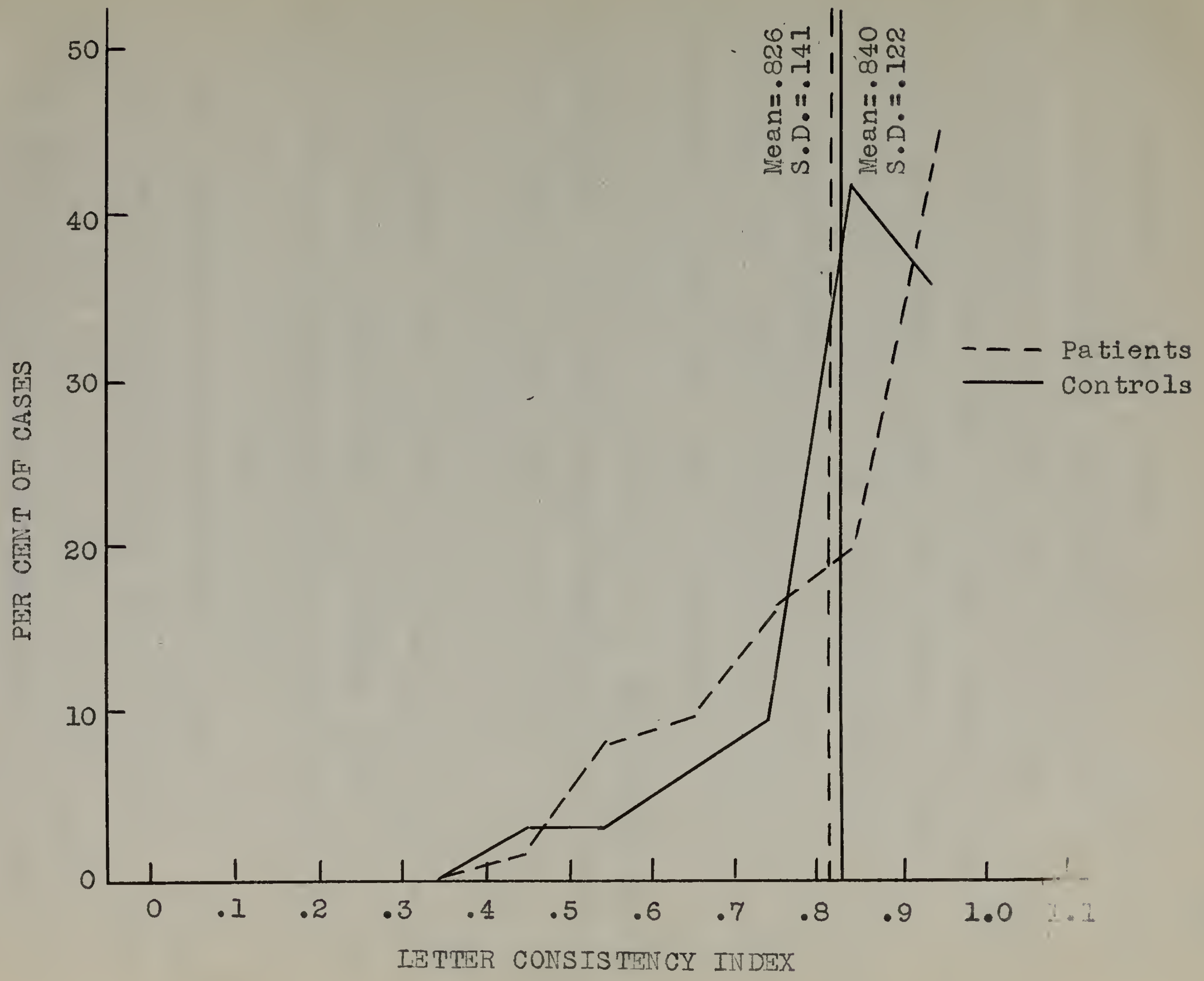


Figure 4
Frequency Distribution of the Letter Consistency Index for 49 Schizophrenics and 31 Normal Controls

with a preferred initial position, but they tend to follow more or less consistently some regular and personally preferred pattern of sequence. Three such regular patterns were found to occur in both normal and patient groups.

A. The clockwise pattern. The subject, if his preferred initial letter is in Position 1, gives the responses in the position order 1, 2, 3, 4; 1, 2, 3, 4, 5; 1, 2, 3, 4, 5, 6 (see p. 22). If his preferred initial letter is the left upper, the position order of the responses is 4, 1, 2, 3; 5, 1, 2, 3, 4; 6, 1, 2, 3, 4, 5. B. The counter-clockwise pattern. The subject gives responses in the following position order: 1, 4, 3, 2; 1, 5, 4, 3, 2; 1, 6, 5, 4, 3, 2; or, 4, 3, 2, 1; 5, 4, 3, 2, 1; 6, 5, 4, 3, 2, 1. C. The reading pattern. The subject reproduces the letters as if he were reading a printed page. He always starts with the upper letter and records the letters in the position 1, 4, 2, 3; 1, 5, 2, 4, 3; 1, 6, 2, 5, 3, 4.[2]

The remaining configurations are irregular to a greater or lesser degree, ranging from the slightly irregular (where

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[2] There was also a fourth pattern which is not too frequent and for statistical evaluation rather unimportant. It has, however, some significance for the qualitative analysis of individual cases. This pattern will be discussed at a later point.

the preferred pattern is clearly detectable and only one or two letters are misplaced) to the entirely irregular (where no pattern whatsoever is recognizable in the response).

Here, again, no attempt was made to account for the reason of the personal preference for a given pattern. An attempt was, however, made to measure the degree of consistency with which the subject adhered to the preferred pattern of sequence in reproducing the letters. The pattern which occurred most frequently was called the preferred pattern. The ratio of the number of responses with the preferred pattern to the total number of responses will be called "the pattern consistency index."

Two patients reproduced so few letters that the pattern of sequence could not be definitely determined in their responses. Thus the computation of pattern consistency for the patients refers to the remaining 47 cases. The frequency distribution of the values of this index for patients and controls is given in Figure 5. The means of the patients are again not significantly different from those of the controls (patients: .622; controls: .586). We have, however, here again a distribution curve which is similar to those which were obtained on two other variables (see Figs. 2 and 4). Of the patients, 8.5 per cent had a pattern consistency index below the value of .200. This was true for none of the control group. The pattern consistency index reached values between .9 and 1.0 in 23.4 per cent of the cases in the patient group but only in 9.7 per cent of the cases in

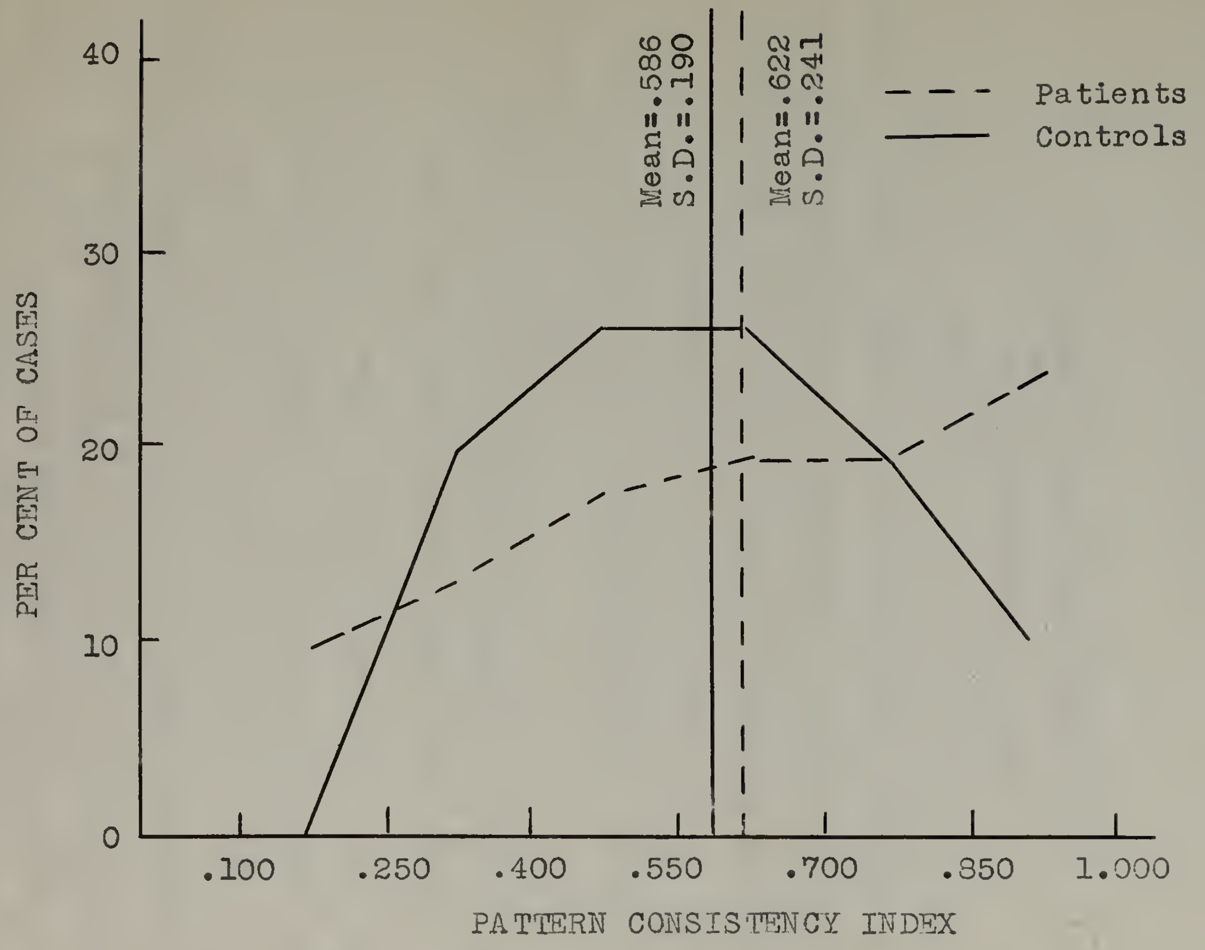

Figure 5
Frequency Distribution of the Pattern Consistency Index for 47 Schizophrenics and 31 Normal Controls

the control group. Thus, we have here a distribution in which more patients have extremely high and extremely low values than do nonpsychotic persons. In the following section an hypothesis will be advanced with regard to this particular type of distribution.

C. An Hypothesis of Type Differences within the Schizophrenic Group.

Three variables were found on which patients more than normal subjects have unusually high and unusually low values. These variables are (1) prevalence of omission or of substitution errors respectively, (2) pattern consistency, and (3), to a lesser extent, letter consistency. It seems worthwhile to consider what the psychological significance of these variables may be.

Although in the control group the omission errors always prevail over the substitution errors, the various subjects still differ from each other considerably: one person scarcely makes any other errors than omissions, while another substitutes letters rather frequently. The first seems to "stick to reality" in a rigid and pedantic way: either he reproduces the letters absolutely correctly or not at all. The second has a much more plastic attitude: he seems to take chances, and if he fails to reproduce some of the letters quite correctly, he at least reproduces

something more or less similar to them.

The two consistency indices indicate whether the subject systematically uses one method in reproducing the letter combinations, or whether he makes unsystematic, haphazard responses.

The psychological meaning of each of these three variables seems to point in the same direction. At the one extreme we have the rigid, methodical, pedantic mode of response with an "obsessive" adherence to the facts; at the other is the loose, unsystematic, drifting type of response with little respect for objectivity and accuracy. There exist, of course, all degrees of transition between the two extremes.

If this tentative interpretation is correct, the meaning of the distribution curve of the patients could be stated as follows: considerably fewer schizophrenic patients than nonpsychotic persons have a balance between rigidity and plasticity. There is a group among the schizophrenic patients which is characterized by an extreme unbending rigidity of their responses; and there is another group who respond in such a way as to indicate a lack of any system or planful organization and twisting arbitrarily the objective reality.

In order to illustrate the above-mentioned differences, we have divided the patients into three groups. We have

selected one third of the patients whose responses with regard to the variables which are considered in this study are similar to those of the average normal control. The remaining two thirds of the patient group can readily be divided into a rigid and into a loose group which we will call R and L, respectively. M will be used to designate the middle group. In dividing the patient group, not only the three variables just mentioned, but also the two other variables discussed in this section, namely, number of total errors and the ratio of uncommon substitutions to total substitutions, were considered. The means of the five variables for the three groups are given in Table 1. The mean values for the entire patient group and the mean values for the normal control group are also included.

This table brings out several points of interest. The first two variables (number of total errors and ratio of uncommon substitutions to total substitutions) do not differentiate clearly Group R and Group L of the patients. They differentiate, however, very definitely the patient group as a whole from the normal controls. This was to be expected from the nature of the distribution curves on these two variables (Figs. 1 and 3). Thus one can say that a high number of total errors and a tendency to make unusual kinds of substitution are characteristic for schizophrenics in general, irrespective of type. This is particularly clear

TABLE 1

Means of Five Variables for the Various Groups of Subjects

Variable	Subjects	Number of Subjects	X ± σx
1. Total number of errors	Patient Group R	16	63.6 ± 4.8
	Patiebt Group L	17	58.6 ± 4.1
	Patient Group M	16	57.5 ± 6.7
	All Patients	49	60.7 ± 3.0
	All Controls	31	33.8 ± 2.8
2. Ratio of uncommon to total substitutions	Patient Group R	5	.858 ± .080
	Patient Group L	17	.900 ± .013
	Patient Group M	15	.857 ± .031
	All Patients	37	.866 ± .016
	All Controls	23	.733 ± .030
3. Ratio of omission errors to total errors	Patient Group R	16	.928 ± .019
	Patient Group L	17	.445 ± .056
	Patient Group M	16	.748 ± .043
	All Patients	49	.702 ± .038
	All Controls	31	.698 ± .031
4. Letter consistency index	Patient Group R	16	.931 ± .019
	Patient Group L	17	.769 ± .033
	Patient Group M	16	.833 ± .043
	All Patients	49	.826 ± .020
	All Controls	31	.840 ± .022
5. Pattern consistency index	Patient Group R	16	.828 ± .032
	Patient Group L	17	.445 ± .038
	Patient Group M	14	.630 ± .007
	All Patients	47	.622 ± .034
	All Controls	31	.586 ± .034

with regard to the number of total errors, while the ratio of uncommon substitutions to total substitutions may have some value for group differentiation also. The difference between Group R and Group L with regard to this variable may or may not be significant. In the "rigid" group (R) there were only 5 patients whose total substitutions were 5 or more, and only for these few patients of this group could the uncommon substitution to total substitution ratio be computed with some degree of reliability.

The next three variables, namely, ratio of omission errors to total errors, letter consistency index, and pattern consistency index clearly differentiate the two groups. On the other hand, when the means of the patient group as a whole are compared with those of the normals, there is no significant difference because the extreme and opposite values of Group R and Group L cancel each other blending into a rather meaningless average.

Summarizing the findings on these five variables, one can state that schizophrenics in general have a greater number of total errors and that they make a greater number of unusual substitutions than do normals. About one third of the schizophrenic patients show the following syndrome: the errors fall almost exclusively in the category of omission; both the letter consistency index and the pattern consistency index are extremely high. Another one third of the patient

group show the syndrome of opposite characteristics: very high proportion of substitution errors and marked inconsistency as measured by letter and pattern consistency indices.

An attempt was made in a preliminary fashion to see whether or not, according to the results of this study, the patients who belong to the same group have any clinical similarities. The names of the patients in Groups R and L were listed in two separate columns. The lists were given to two psychiatrists who were well acquainted with these patients. They were told that an experiment seemed to suggest that the patients listed in the same column are in some respects similar. They were then asked to tell in what way, if any, the patients listed in the same group are similar and in what respect, if any, do the two groups differ. The opinions of the two psychiatrists were essentially the same and brought out the following points: (1) In R ("rigid" group) the majority of cases belong to the paranoid type or at least show prevalence of paranoid features. There are, however, in the group a few patients for whom this generalization is not valid. (2) In L ("loose" group) the majority of the cases belong to the hebephrenic group, although there are some exceptions. (3) Group R has a better superficial adjustment than Group L. (4) Group R is rather well "preserved", while most of the patients in Group L are greatly disorganized. (5) One of the two psychiatrists mentioned

the great rigidity of personality in Group R.

The suggested association of the two groups with paranoid and hebephrenic characteristics, respectively, is well in agreement with our interpretation of the experimental results. Among the schizophrenic group, the paranoids are those who are said to have the most rigid attitudes. The hebephrenics, in general, are the most disorganized and the most unsystematic and they also have least regard for objective reality, which they readily distort in bizarre ways.

Some comparative psychological studies with schizophrenic and normal persons which have been carried out previously at the Worcester State Hospital point in the same direction as the result of the present study. Shakow and Rosenzweig(1), studying the constructions of schizophrenics and normal persons in a play situation, found that in a number of characteristics the hebephrenic group deviated from the normal in one direction, the paranoid in an opposite direction. The findings of these authors on the item "rigidity" are particularly relevant to the present problem. They state "as to the rigidity shown by the subjects in the interpretation of the objects provided them, both the paranoids and the hebephrenics deviate markedly from the normal subjects in this respect--the paranoids by their rigid literalness, the

hebephrenics by their shifting and sometimes bizarre assignment of meaning" (1, p.42).

In another investigation in which the responses of schizophrenic and normal persons to an auditory apperceptive test were studied, Shakow (2) observed that the paranoid patients tended to adhere very rigidity to the objective stimulus pattern while the responses of the hebephrenics had often only very remote relation to the stimulus.

From our own data, it does not seem that the tachistoscope test results indicate only hebephrenic or paranoid characteristics. In spite of agreement in general, there are a few definite discrepancies between the experimental results and the psychiatrists' classifications. It seems more likely that the experimental results reveal type differences among schizophrenic patients which are related to, but not identical with, hebephrenic and paranoid characteristics, respectively.

D. Examples of the Test Results Obtained in Paranoid and in Hebephrenic Patients.

In order to convey a more concrete picture of the test results obtained in these experiments I wish to give some illustrations of the type of material which has been gathered. For brevity's sake only two examples will be given, the one a paranoid schizophrenic patient, the other a hebephrenic one.

The test results in the first case show those features which we have interpreted as indicators of a rigid personality; the second case shows those characteristics which we have interpreted as signs of a loose personality organization.

The first case is that of patient E.L. who has been diagnosed as suffering from Schizophrenia, Paranoid Type. He was admitted to the Worcester State Hospital on February 12, 1937 with the physician's statement that for the preceding year and a half he had many religious preoccupations and then shortly before admission he developed persecutory and grandiose ideas and auditory hallucinations. At the hospital he claimed that he was Christ and that his second coming had been prophesied by one of the founders of his religion (Seventh Day Adventist). He was quite perturbed because the local members of his church would not honor him as Christ. The patient also believed that evil spirits were possessing his body, claiming that there are as many as a thousand spirits in him, ranging from the size of a pinhead to the largest, 3 or 4 feet tall. He can hear the spirits talking and at night he occasionally sees a spirit standing at the foot of his bed. All this is done by a "witcher" and a witch. The witcher, who is "Satan in the flesh" is the patient's brother and he "has to call him brother because they were born of the same mother." The witch is

his sister. Besides making him be possessed by evil spirits the witch is also putting foul odors and tastes in his food.

Patient also felt that he was followed and persecuted. On one occasion he made a signboard with the following inscription: E.L. (patient's name) HAS BEEN THREATENED TO BE DESTROYED. -HELP PREVENT THIS THREAT FROM BEING CARRIED OUT- AND PRESERVE THE PEACE OF THE WORLD.-

In the course of years there were some minor variations in the patient's clinical state, but he firmly retained his particular delusional system of grandeur and persecution.

The test results are quite characteristic for the kind of responses obtained in this type of patient. To be brief, only the results obtained in the first session will be given below: the results of the second and third sessions are practically identical with those of the first session.

1) F K X B T
2) W N R H
3) H N Y
4) C P T D
5) V P D C
6) J X B K
7) F Z C P
8) R X Y
9) S X Y Z
10) T W H L
11) P N K W
12) V D T L

The patient makes only 13 errors in this session.[3]

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[3] For the evaluation of the test results compare them with the actually exposed letter combinations. The letter combinations used are appended.

This is a normal average result. In this respect the patient does not show any pathological deviation. Most of the patients who show in other respects similar test results to that of E.L. have usually a higher than normal total error.

Attention is called to the fact that all the letters which the patient reproduces are perfectly correct. Substitution errors are entirely absent.

The next characteristic feature is that the subject always starts his response with a letter of a particular position, in this case with the uppermost on the exposure card. The patient's constancy in this respect is 100 per cent.

Finally he reproduces the letters very consistently always in the same order of sequence. (His particular order is what we call the "reading pattern".)

The next example is the case of H.A., a schizophrenic patient of the hebephrenic type. He was admitted to the hospital at the age of 27 years, on December 30, 1933. For about three years previous to this he was gradually losing interest in his work and one year previous to his admission to the hospital he stopped working altogether. He began to tell extremely phantastic stories. Finally he wanted to stay in bed all the time. He expressed the idea that his parents were not his own and he claimed at one time to be

a German, at another time a "full-blooded Indian." In the hospital he behaved in a quiet manner, but had a wealth of bizarre notions of very changeable character, e.g., he claimed one day to be the only survivor of the Titanic, having been saved by a sword fish. Next day he thought he was the German Crown Prince, then the serpent in the Garden of Eden. He also felt that people were reading his mind and that he was able to read other people's minds. The patient also had a great many bizarre somatic delusions; he thought that his skull had been stolen and a wooden frame substituted for it; he also felt that parts of his body were not really his own. He very frequently heard "voices" coming sometimes from the outside, sometimes from his own stomach. Clinically the great variety of extremely bizarre notions was the most outstanding feature.

The test results of this patient are almost in every respect the opposite from those of the first case. Again in the present case only the results of the first session are reported; the results of the other session show even more markedly the characteristics that are rather clear also in the results given below:

1) F K B J $\underline{Y}$
2) W N H R
3) W H N R V
4) C D Y $\underline{W}$ $\underline{H}$ P
5) V P C $\overline{D}$ $\underline{X}$
6) J B $\underline{H}$ $\underline{Y}$
7) F Z P C
8) P M R $\underline{A}$ S
9) $\overline{S}$ Z H $\overline{C}$ $\underline{B}$ F
10) T W N H $\overline{R}$
11) P W R N $\underline{\overline{H}}$ D
12) $\underline{W}$ D T V

The total number of errors again is close to the normal mean. The type of errors, however, is markedly different from that seen in the previous case. He omits only two letters, all the remaining errors are substitutions. (The letters which are underlined are substitutions.)

The so-called letter consistency is high--as in most normal and schizophrenic patients. His preferred initial position is the upper one, but on three occasions (in responses 4, 8, and 12) he deviates from this method.

In contrast to the first case the spatial order in reproducing the letters does not follow a fixed pattern. On three occasions (responses 1, 2, and 5) he uses a contra-clockwise pattern. In response 6 and 7 he uses a clockwise pattern. In the rest of the responses the spatial order of reproduction is to a lesser or greater extent irregular. In other words "his pattern consistency" is extremely low. Besides, there are many irregular patterns.

Summarizing we can say that in the case of the paranoid patient we find a high consistency of method coupled with absence of substitution errors and in the case of the hebephrenic patient we find a low consistency of method and a high number of substitution errors.

E. Comparison of Results of Three Sessions.

As mentioned earlier, the experiments were made in three separate sessions with each patient. A comparison of the results of the three sessions reveals that the influence of practice and learning of letter combinations has been underestimated in planning this experiment. Since, however, the conditions were the same for all subjects, a comparison is still possible. The percentage distribution of errors in the three sessions for the patients and the normal controls is as follows:

	1st Session Per Cent	2nd Session Per Cent	3d Session Per Cent
Controls......	29	41	30
Patients......	32	36	32

The per cent of errors made during the first and third sessions in both groups of subjects is practically the same, while in the second session more errors were made than in either the first or the third session. This increase of errors in the second session is particularly marked in the control group, but is definitely present also in the patient group. The differences in the number of errors are due to the particular setting of this experiment. In the first session the first series of cards was exposed for practice, and then later the same series of cards was used for the real test. In the second session a second series of cards

containing letter combinations entirely different from those in the first series was presented and the number of errors increased. The third series of cards given in the third session was a combination of the first and second series. The number of errors was about the same here as in the first session. In the first session the subject probably had the advantage of the shortness of time elapsing between exposures. In the third session he probably had the advantage of a greater amount of practice and possibly some learning of the letter combinations which were previously exposed.

The correlations of the number of total errors between the various sessions are given in Table 2. This table shows that the subjects are rather consistent from session to session.

The degree of self-consistency is an important factor in considering the possibility of using this technic as a test. The problem of consistency cannot, however, be reliably studied by use of the data at hand. To obtain accurate information, the problem of self-consistency should be restudied under experimental conditions which would exclude the effects of learning to a greater extent than was done in the present study.

TABLE 2

Correlations of the Number of Total Errors Between Various Sessions

Sessions	r	
	Patients	Controls
I and II.	.87	.80
I and III	.56	.71
II and III	.87	.80

III. DISCUSSION AND CONCLUSIONS

This brief review of the results of a comparative study of schizophrenic and normal (nonpsychotic) persons with the aid of the described tachistoscopic method reveals a number of points of interest. An inspection of the data suggests that this method reveals a great number of features with regard to which marked differences exist between the two groups and also within the groups themselves. Of these features, only five are discussed at this point.

1. Number of total errors. Under the described experimental condition schizophrenic patients as a group make nearly twice as many errors as do nonpsychotic subjects. This difference probably signifies difference of attention and of speed of response in the two groups. This result is not new. Several authors (3, 4, 5) have found that the simple reaction time for schizophrenic patients as a group

is definitely prolonged as compared with nonpsychotic individuals.

With regard to the total number of errors, there is considerable overlapping between the two groups. The highest number of total errors in the control group is 65 (one case). Therefore, values above 70, let us say, can be considered definitely abnormal. About one third (35 per cent) of our patients had errors above this value and hence could be differentiated from the normals even on the basis of this single criterion alone. The usefulness of this variable for diagnostic purposes may, however, be increased if weighted together with other variables.[4]

2. Common and uncommon substitution errors. As mentioned before, an error may consist either in not reporting a letter (omission) or in reporting the wrong letter (substitution). There are marked differences between the two groups of subjects in regard to the type of substitution. In this section only a preliminary analysis of this variable is made. The substitution errors are roughly divided into such as were found common for nonpsychotic individuals and such as were found uncommon for them. The proportion of

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[4] Such procedure would be analogous to that employed by Rodnick and Shakow (6) to devise a composite index on the basis of several variables of a modified reaction-time procedure.

uncommon substitution is significantly higher in the patients than in the normal control group. Thus we have here a second variable which promises to be a useful item for the construction of a composite diagnostic index. The distinction between common and uncommon error is, however, only a rough measure; it does not reveal those notable differences of visual Gestalt transformation which were observed.

3. Other variables. The remaining three variables which are discussed in this section are relevant not for distinguishing between schizophrenic and nonpsychotic persons but rather for distinguishing groups within the schizophrenic population. One group is characterized by a syndrome of a rigid and pedantic adherence to the factual as indicated by the almost entire absence of substitution errors and an inflexible, stubborn, consistent holding to some personally preferred method as indicated by the extremely high values of the two consistency measures. The other group shows the opposite characteristics.

Two types--a somewhat rigid and a rather plastic--exist already in the normal control group representing the ends of the distribution. Among the schizophrenic patients, however, there is one group which greatly exceeds the rigidity of the normals and another which shows the opposite traits to such an extent that it no more can be called

plastic, but rather loose, inconsistent, and disorganized. A preliminary rating of the clinical picture and personality of these patients is in considerable agreement with the distinction based on the experimental findings.

In the Introduction we have enumerated several requirements which a technique for personality diagnosis should fulfill. The results obtained indicate that all these requirements are rather well met by the method used in this investigation. First, this is an experimental technique that allows us to control the various variables. At the end of the first part of the investigation it became clear that certain modifications have to be made in the method in order to obtain better controlled results. Some of these modifications--as we shall see--were introduced in the second part of the study;and some further refinements could be made in the future on the basis of the experience with this technique so far.

The second requirement mentioned in the Introduction is that the technique should clearly distinguish one person from the other. The distribution of the variables reported have wide ranges; that is, the subjects composing the groups are rather widely separated from one another. The only exception to this is the "letter consistency index" and consequently this variable has much more limited diagnostic value than the others.

As a third requirement it was mentioned that a reliable personality test should give rather consistent results; that is, it must be relatively unaffected by changes in the momentary situation. Because of a previously mentioned defect in our experimental setting, no exact figures can be given with regard to the consistency of the various features of the response, but the available evidence seemed to indicate high consistency. Inspection of the data clearly shows that, for instance, when the errors made by a subject in one session are mainly substitution errors, he will show a high proportion of substitution errors in all other sessions. The same is also true with regard to other features of the response. In the second part of the study attention will be called to certain cases in which the results on two separate sessions do not seem to be consistent with each other. This discrepancy is, however, more apparent than real and it will be discussed in some detail.

Finally, it was pointed out that the value of a personality test depends upon the significance of the features which are detected by it. Our technique seems to have tapped so far essentially two personality traits: rigidity, pedantry, obsessiveness on the one hand and looseness, inconsistency and the tendency toward disorganization on the other. These features will be even more clearly demonstrated in the second part of the study where it will be

shown that certain other personality characteristics can also be detected by this method.

The seemingly unimportant nature of the functions immediately involved in this test is in no way an argument against the significance which these apparently simple processes convey. The test results which in themselves are rather peripheral may be evaluated as symptoms of certain central features of the personality. It is reasonable to assume that personality differences are expressed not only in highly complex but also in rather simple manifestations.

If it is true that "the personality is a whole" which is organized at all levels of complexity according to the same principles, then it is not astonishing to find the particular individual characteristics of a person reveal themselves not only in his highly complicated forms of experience and behavior, but even in his relatively simple perceptual functions. The sameness of organization at all levels of the organism goes even further. Thus the studies made in the St. Elizabeth Hospital in Washington by N.D.C. Lewis (7) and also by W. A. White (8) showed remarkable parallelism between the psychological and physiological modes of functioning, the latter reflecting itself even at the more fixed realm of anatomical structure. Further examples of the pervasiveness of individual patterns through all levels of the organism can be found in the recent literature

on psychosomatic medicine. If certain fundamental similarities appear between the physiological and psychological modes of functioning in the same person, the more this may be expected to be true when psychological functions, however of different complexity, are compared. The Rorschach test is an excellent example of this. Like the Rorschach test, the tachistoscopic arrangement has the advantage of being apparently impersonal and does not put the person on his guard; that is, the test situation appears innocuous to the subject and does not mobilize his higher critical, repressive, and controlling attitudes.

The results obtained in the first part of the study were encouraging enough to warrant an exploration of the further potentialities of this technique. The results of these subsequent studies will be reported in Part II.

Part II.

Psychodiagnostic Studies with a Group of Psychiatric Out-Patients.

I. PLAN OF THE SECOND PART OF THE STUDY.

MODIFICATION OF TECHNIQUE.

After the completion of the first part of the study, the lines along which further investigation appeared profitable were rather clearly indicated. We have advanced the hypothesis that our technique is testing mainly two personality traits, namely rigid and loose personality organization.

Two ways suggested themselves to test the validity of this hypothesis. One way would be to compare the tachistoscopic results of normal subjects with their results on some suitable personality test or with ratings by competent judges. The other method that suggested itself was to examine with the tachistoscopic technique a group of such subjects which are known to show the personality traits in question in a marked degree. For this latter purpose patients with various types of psychoneurosis seemed particularly suitable. It was thought, e.g., if certain features of the test results indicated a rigid over-systematic, pedantic personality, those features ought to be particularly clearly present in persons suffering from an obsessional neurosis.

The advantage of working with normal subjects or with psychoneurotics were rather evenly balanced, but finally it

was decided to work with the psychoneurotic subjects and to leave the investigation with normal subjects for some future study. This choice was particularly determined by the fact that Dr. Nolan D. C. Lewis, Director of the New York State Psychiatric Institute and Hospital, became interested in my work and offered me the facilities of the Vanderbilt Clinic (Presbyterian Hospital) for the examination of a group of psychiatric outpatients. During a six month period 112 patients were examined at the Department of Psychiatry, Vanderbilt Clinic. No selection of patients was made in advance and the clinical records were consulted only after the test had been given to each patient.

On the basis of the previous experience with schizophrenic and normal subjects it appeared feasible to introduce certain changes in the technique used.

a) It was felt that the number of experimental sessions can be safely reduced to two instead of three sessions previously used. This time saving simplification could be done without any disadvantage because it was seen that in two sessions all the significant observations which can be made with the aid of our technique could be obtained and thus a third session was largely superfluous.

b) It was mentioned in Part I that the method used involved some repetition of the same exposure cards. We have also seen that contrary to our expectation a certain

amount of learning occurs in these experiments. In order to eliminate the effects of learning and thus simplify the evaluation of the results it seemed advisable not to use the same letter combination twice. While previously the first series of cards had been used for practice, now 4 new letter combinations were made to be used for practice. (See Appendix 4) Furthermore, in Part I only the first and the third series of cards were independent letter combinations, while the series used in the second session was a combination of the first and third series. Since now only two sessions were held with the patient the second series was omitted and thus the repetition of letter combinations was avoided. In other words, from now on the first series of cards was used in the first session and the third series of cards was used in the second session.

For the sake of easier bookkeeping a recording sheet was devised, a copy of which is appended (Appendix 5). The results of each session are recorded on a separate sheet. Two such tabulating sheets, one or more sheets of evaluation of the test results, one or more sheets of excerpts from the psychiatrist's notes constitute the material on each patient.

In that portion of the study which has been reported in Part I only those features of the test results were considered which could be treated statistically. This

method of analysis gave accurate quantitative results, but on the other hand many interesting features had to be disregarded, since they did not seem to lend themselves easily to statistical evaluation. At the conclusion of the first part of the study it was felt that by aiming at greater objectivity too much valuable information had to be disregarded and it was decided to emphasize in the second part the qualitative evaluation of individual cases. In this connection one may consider the fact that one of the most helpful psychodiagnostic methods, the Rorschach Ink Blot Test, has been for a long time an entirely qualitative method and the attempts to quantify it are of rather recent date.

II. METHOD OF ANALYSIS

In order to evaluate the test in a given case a great many features of the subject's responses have to be considered. In a somewhat similar fashion, as in the Ink Blot Test, the single features of the test results apparently have a somewhat different meaning depending on the other coexisting features of the subject's responses. For this reason it seems convenient to discuss briefly first the single features of the test results and then consider some of the typical combinations of these features.

The interpretation of the various features of the test results involves an anticipation of some of the conclusions of our analysis and logically would belong at the end of the thesis, but in order to facilitate the presentation it will be given first.

We are already acquainted from the first part of the study with some of the features which have to be considered in evaluating the test results in any given case. These features we repeat only briefly.

A. The total number of errors. In general we may say that the number of letters a subject is able to perceive correctly during a short time exposure indicates his speed of reaction, his general mental alertness. The significance of this variable is somewhat ambiguous because there are several factors such as age, intelligence, depressed mood which may influence it. We will discuss this point in a later section (p. 96)in some detail.

B. The relationship of substitutions and omissions among the errors. With the exception of very few cases the omissions are much more numerous than the substitutions in all groups of subjects (normals, schizophrenics, out-patients). The errors in the normal control group are constituted of 70% omissions and 30% substitutions. A marked deviation from this average in either direction seems to be significant. The absence of substitutions

seems to be related to such traits as rigid adherence to objective reality, fear of making mistakes, over-conscientiousness, obsessiveness. An excessive use of substitutions corresponds to the opposite traits. In some instances the presence of too many substitutions is related to over-anxiousness, to feelings of inferiority with a tendency to over-compensation, or to a tendency to function beyond one's capacity by taking unreasonable chances. An extreme frequency of substitutions seems to indicate autism, obliviousness to environmental realities. It was found that when the tendency to substitute is very marked, one can safely make the diagnosis of schizophrenia.

In some instances when a patient reports some letters incorrectly it seems that this is caused by a strong tendency to a particular type of perseveration. This phenomenon was found to have an important diagnostic value and is discussed in detail in a later section (p. 105).

C. The relationship between common and uncommon types of substitutions. This was one of the features on which schizophrenics were found to differ from the normal subjects. Among the normal and the neurotic subjects substitutions, however, occur in relatively small numbers and hence it did not seem particularly useful to divide the substitutions into common and uncommon ones. Thus, in the second part of the study no use was made of this distinction.

D. The letter consistency index. The subjects have the tendency to start more or less consistently with a letter of a certain position. The self-consistency of the patient was measured by the so-called "letter consistency index." This index is in general in all types of subjects rather high and therefore, if taken alone, is not a very fine tool of differentiation. It is valuable, however, when it is considered in conjunction with other features.

E. The pattern consistency index. The subjects have the tendency to follow in their responses some personally preferred spatial pattern of sequence. The degree of consistency as measured by the "pattern consistency index" proved to be one of the most valuable single indications of personality diagnosis. High consistency is found in pedantic, obsessively rigid persons and low consistency in loosely organized or disorganized persons.

In addition to the above mentioned five variables with which we are already acquainted from the first part of the study a number of additional features were also considered in the second part.

F. The distribution of errors. In the test results there is usually a clear indication whether the patient functions at the level of his actual capacity or below it. This can be most clearly seen from the way the errors are distributed over the twelve responses of a session. For a normal person a rather even distribution is the rule. If a subject, e.g., reports at one exposure 4 letters

correctly then he will fairly consistently report 4 letters at each following exposure, only occasionally giving one more or less. Our experience taught us that if the number of letters reported at the various exposures differs from each other more than one letter, one may suspect the influence of some interfering factor; and when they differ more than 2 letters the presence of such a factor is practically certain.

The unevenness of distribution may be of the following types:

a) Shock in the face of a difficulty. This type of distribution can be illustrated schematically in the following way:

Number of letters exposed : 5 4 6 6 5 4 4 5 6 5 6 4
Number of letters reported: 3 4 2 3 4 4 4 5 2 5 3 4

Such results show first of all that the patient functions below his actual capacity. He is definitely able to perceive 4 letters, occasionally even 5 during a 0.5 second period, but sometimes he reports only 2 or 3 letters.

Secondly, and this is more important, the patient does always very poorly when 6 letters are exposed. That is, the subject does well as long as the task appears easy to him, but as soon as the task becomes difficult the subject apparently gets confounded by the larger number of letters and

responds more poorly than he actually could. He gets a "shock", becomes discouraged, paralyzed in the face of difficulties and thus functions far below his actual capacity. As will be seen later, the clinical description of such patients definitely confirms the justification of this interpretation.

b) Initial blocking. Another type of unevenness in the distribution of errors is not related to the difficulty of the task, but consists in an initial blocking seen in shy people who are embarrassed in new situations. As soon as the initial blocking is over, they reach, or at least come closer to their optimal level. In these subjects the first response usually is the poorest, soon followed by a gradual improvement of achievement.

The initial blocking can be best determined quantitatively by comparing the number of errors made on the first six cards with those made on the last six cards. (The 12 cards of a session are so arranged that the first six cards contain exactly as many letters as the last six cards.) As a rule, normal subjects do just slightly worse, if at all, on the first six cards. Therefore a small difference may not be significant. In a case, however, when during one session a subject makes 15 errors, of which 10 are made on the first six cards and only five on the last six cards, we are justified in speaking of an initial blocking. The subjects who give such signs of initial

blocking usually do worse also in the first session than in the second session.

c) Endogenous disturbances. Some subjects show a distinctly uneven distribution of their errors--e.g., responding with 5 or 6 letters to some card and only with 2 or 3 to others--but their poor responses are neither in relation to the difficulty of the task nor do they occur prevalently during the first part of the session. Apparently such sporadic poor responses are not caused by any difficulty in the situation but by an inner emotional upset or some other sort of endogenous disturbance. This phenomenon occurs most frequently in schizophrenic patients with marked autistic preoccupations.

d) Unusually even distribution of errors. As mentioned before, a rather even distribution of errors is a rule among the normal subjects. On the other hand, an extremely even distribution--e.g., when a patient always reports 3 letters, never more and never less--has to be considered as a deviation from the norm. Most frequently this peculiarity is found in subjects who show various signs of rigid personality organization in their test results. Possibly the unusual evenness is an indication of the level of aspiration of the person: a limited goal to which the person adheres rigidly.

G. Signs of overanxiousness. The test results give a definite indication whether the patient is too eager or not to make a good impression. Eagerness to make a good impression is seen mostly in persons who show clinically feelings of inferiority and a tendency to compensate for them. In this connection the following may be noted: a) The position of errors in the single response given seems to have definite diagnostic value. As a rule it is towards the end of the response where most of the errors occur. This is to be expected: the last letters are probably the most vaguely perceived ones and thus most likely to be omitted or substituted according to the prevailing method of the subject. If substitution errors occur at the end of the difficult cards (the 5's and 6's) this usually can be taken as a sign that the person is trying to go beyond his capacity, trying to make a good impression in spite of the fact that he has to take chances. b) Another sign of eagerness to do well, of overambitiousness, is "skipping". Suppose a patient can reproduce four letters and suppose he starts with the upper letter and has a clockwise pattern. In this case one would expect his response to be 1, 2, 3, 4 (See diagram p. 22). Now, patients who show "skipping" will frequently give such responses as 1,2,3,5, or 1,2,3,6, or 1, 2,5,6, etc. That is, they hurry to the end and in their eagerness skip intermediate letters.

III. ANALYSIS OF THE TEST RESULTS OBTAINED WITH PSYCHIATRIC OUTPATIENTS.

In the previous section the most outstanding features to be considered in evaluating the test results were briefly described. In this section a group of outpatients at the Vanderbilt Clinic will be analyzed.

There are two ways open for the analysis of the material. One can either inquire whether there is any relationship between the test results and the clinical diagnosis or one can inquire whether a relationship exists between the test results and the outstanding personality traits of the patient.

In order to make correlations with the clinical diagnosis, the ideal situation would be to select for the study such cases that fall clearly into one or the other of the established diagnostic categories and to leave for the time being the "mixed cases" out of consideration. Actually, in an unselected group the mixed cases always predominate. The patients coming to a psychiatric outpatient clinic are probably an even more mixed group diagnostically than an unselected group of psychoneurotics. There are several cases of psychosis in the group. Furthermore, the majority of the patients do not come to the clinic for psychiatric aid because of clear cut neurotic

difficulties, but many are referred to the Psychiatric Clinic from a medical clinic where they were seeking help for some physical complaint, the reason for referral being the absence of organic changes or the presence of mental difficulties accompanying some actual physical illness. Thus in an out-patient clinic there is an unintentional selection of patients in favor of those in whom physical complaints of a functional origin prevail. The clinical picture is most frequently of a mixed type.

A correlation between the test results and certain personality traits as revealed by the clinical description is often not easy. The clinician's attention is focused--and rightly so--chiefly on contentual material, on the content of the patient's conflicts and preoccupations. The test results, on the other hand, tell very little about content, but rather indicate certain formal features of personality organization. In spite of these difficulties a comparison between the test results and the clinical description is rather revealing.

The patients fall readily into a number of groups with well marked differentiating characteristics in their test results. This will be demonstrated by describing and analyzing the individual cases. It would be cumbersome and repetitious to report individually all the cases which have

been tested but a sufficient number of examples will be given to illustrate the various points. A certain portion of cases tested at the Vanderbilt Clinic will have to be entirely disregarded. Thus, for example, there were several cases in the group suffering from a schizophrenic psychosis whose test results did not bring out anything new beyond the features described in Part I. It was, however, gratifying that in practically every case we were able to identify these subjects as schizophrenics on the basis of their test results and this has been confirmed by their clinical diagnosis.

Besides the schizophrenics there were certain other cases that had to be disregarded because in some of the diagnostic groups we did not have enough cases. Some cases with traumatic brain injuries, brain tumor, chronic encephalitis, general paresis, etc. have been examined also because we did not know the diagnosis in advance. The test results in some of these cases were rather interesting but because of the small number of cases in these diagnostic categories no generalizations could be made with regard to the test result.

A. Group I. Outstanding feature: Rigidity.

The test results obtained with this group of patients may be illustrated by the responses of patient Sh.B.B.

During the first session he gave the following 12 responses.[5]

Case 1

Test Results of Sh.B.B.

First Session		Second Session	
1. K F X J B	7. F C P Z	1. F K B	7. K Z L N
2. W R H N	8. R Y S M X	2. Y K S M	8. Z C M
3. H N Y	9. S F H C	3. B T W M J	9. F R W B T
4. C T L V	10. T N H L W	4. X B K S Y	10. D F Z S N
5. V D C Z P	11. P K R W	5. P V X	11. Z X J
6. J B K X	12. V T L D	6. B W T F	12. X H D P

In the first session this patient reproduces 51 letters of the 60 presented to him, omitting thus only 9 letters; in the second session he reproduces 48 letters correctly and omits 12. This is somewhat better than the average in the normal control group and indicates considerable alertness and good speed of reaction.

It is remarkable that the patient does not substitute wrong letters at all: he either reproduces the letters accurately or not at all. Literally the absence of substitutions is a sign of accuracy, but it has been found

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[5] Compare the responses with the list of letters exposed which is appended.

that absence of substitutions occurs in persons who show such traits as overconscientiousness, fear of making mistakes, pedantry, rigidity.

Next the distribution of errors is to be considered. We see that all the exposure cards with 4 or 5 letters are reproduced perfectly, showing that the patient is able to grasp 5 letters correctly in 0.5 seconds. We see, however, that when cards with 6 letters are exposed, he shows what we called "shock in the face of a difficulty." On the first card containing 6 letters (No. 3) he reports only 3 letters; on the other three cards with 6 letters (No. 4, 9, 11) he reports 4 letters. It seems that when the patient is confronted with a task which appears difficult to him he is working below the highest level of achievement possible for him. In the second session he shows less shock but some indications of it are present. In addition he does poorly on the first response due to a tendency to initial shock.

From these features one is justified to conclude furthermore that the number of errors made by the patient is somewhat below his optimum and thus he is probably even more alert than the numbers of errors would indicate.

The patient starts his responses--with the exception of the first response of the first session--always with the letter which has the uppermost position on the exposure

card. He then reproduces the letters very consistently in a clockwise manner. Both these consistencies indicate that the person is methodical and adheres rigidly to his method. It is interesting that the only exception is on response No. 3 of the first session; apparently when he is first faced with a difficult task he not only makes more errors but also his system tends to break down.

The patient frequently skips intermediate letters, which we interpreted as a sign of eagerness to do well.

Clinically, this 31 year old radio mechanic has been suffering since adolescence from a severe obsessive fear of tuberculosis. (Patient's father died of tuberculosis.) The patient is greatly disturbed in his work by his obsessive fear. The chronic obsessive concern and fear of this patient correlated well with the test results which clearly indicate a rigid, oversystematic, obsessive type of personality.

In the following two cases there is no such clear cut and almost monosymptomatic obsessional neurosis as in the case of Sh. B.B., but the obsessive features are still quite dominant.

Case 2

Test Results of N. W.

First Session		Second Session	
1. F X J	7. F L C	1. F V K	7. K N Z L
2. W N R	8. R X Y S	2. Y M K	8. Z L C H
3. H N Y	9. S X F H	3. B J T	9. F K R H
4. C P T H	10. T W N H	4. X C B	10. N D F S
5. V P D	11. B N K	5. P W B X	11. Z F X L
6. J X B	12. V D T	6. B F W T	12. X P H

The patient has a somewhat higher than normal total errors--21 in the first and 20 in the second session. His errors are almost exclusively in the nature of omissions and there is only one substitution in the first session (H in response 4) and two in the second session (H in response 9 and L in response 11).

There is no sign of shock but the distribution of errors shows another peculiarity: in the first session almost always only three letters are reproduced although the subject is able to reproduce four letters correctly as shown in several other responses. This seems to indicate an overcautious attitude, a cautious limitation of his level of aspiration. This feature is found in the test results of such patients only who show also other signs of rigidity in their test results. In the first four responses of Session 2 he

is again limiting himself to three letters, then he steps up his level cautiously to four but never attempts to go beyond that.

His consistencies are high: he starts always with the uppermost letter and reproduces the letters in an order which we called the reading pattern. He deviates slightly from this pattern on only two occasions (Responses 1 and 7) during the first session and only once (Response 10) during the second session.

This 33 year old man came to the Clinic with complaints of feelings of unreality and disturbing obsessive thoughts that his wife and children are not his own. He also had an obsessive fear of becoming insane ever since he was 16 years old.

Case 3

Test Results on J. H.

First Session

1. K F X
2. W N R H
3. H N Y
4. C P T
5. V P D C
6. J X B K
7. F Z C B
8. R X Y M S
9. S X F
10. T W H N
11. P N K
12. V D T L

Second Session

1. F V K
2. Y M K S
3. B J T
4. X C B
5. P W B X
6. B F W P
7. K N Z L
8. Z L C M
9. F K R
10. D N F S
11. Z F X S
12. X P H D

The total number of errors is 18 and 19 in the first and the second sessions respectively which is somewhat above the normal mean but we shall see that this patient is working below his optimal level so that no particular significance can be attached to the somewhat high number of errors.

The errors are prevalently omissions, there being only one substitution in the first session (B instead of P in Response 7) and two in the second session (P instead of T in Response 6, and S instead of B in Response 11).

The distribution of errors shows very clearly a "shock in the face of difficulty": he always reports at least 4 letters when not more than 5 are presented but when six letters are presented he responds only with 3 letters. Furthermore, his first response in each session consists only of 3 letters; "initial shock". Naturally these shock reactions increase the total number of errors beyond what the patient otherwise could accomplish. His preferred initial letter is the upper ohe and his pattern the reading pattern. He is quite consistent, deviating only on two occasions from his pattern (Responses 1 and 10) during the first session, but being 100% consistent during the second session.

Clinically, this 31 year old man made an exceedingly reserved, cautious and somewhat aloof appearance. For the

past ten to fifteen years he has been seeing about 150 physicians because of various hypochondriac complaints and complaints of obsessional doubts. He is suffering also from severe chronic constipation--a feature which is generally believed to be frequently associated with an obsessive, compulsive character structure.

In our case material there are very few cases which were diagnosed as obsessive-compulsive neurosis. Their test results invariably show such signs which we have interpreted as indicating great rigidity of personality structure. On the other hand, a considerable percentage of the patients who were not diagnosed as suffering from an obsessive compulsive neurosis showed also these signs of rigidity.

The great majority of these "rigid" cases is characterized clinically by an excessive concern over an actual physical illness. The following two examples illustrate this:

Case 4

Test Results of patient G.S.

First Session		Second Session	
1. K F R	7. X F C	1. V F K	7. N K L
2. N W R	8. X R Y	2. M Y K S	8. L Z C
3. N H Y	9. X F S	3. J B T	9. K F R
4. P C T	10. W T H L	4. C X B	10. N D F S
5. P V D	11. N P K	5. W P B X	11. F Z X
6. X J B	12. D V T L	6. F B W T	12. P X H D

In the first session the patient has a total number of errors 23 of which is definitely higher than normal average. This is, however, probably below the patient's optimum. He has, during the first session, a particularly even distribution of errors, limiting himself cautiously to 3 letters except in Response No. 10 and 12 where he reports 4 letters. Apparently he fixes his level of aspiration cautiously somewhat low and adheres to it rigidly. In the second session he makes only 19 errors. Even this may not be optimal for the patient for the following reasons: 1) In the second session he responds to the difficult cards (those containing 6 letters) always only with 3 letters, while on the easiest cards (those with 4 letters) he reproduces 4 letters on three out of four cards. To the cards with 5 letters he responds twice with 4 and twice with 3 letters. Thus, there is a definite inverse relation between the difficulty of the task and achievement. One may then say that the subject is probably normally alert, or only slightly slowed down and that he has a somewhat high error score because he takes an overcautious attitude and because he is disturbed when faced with a somewhat difficult task.

He makes 2 substitutions at the first session (R in Response 1 and X in Response 4) and none at the second

session. He substitutes considerably less than the average normal subject: an accurate and cautious person who does not take chances.

The patient starts invariably with the left upper letter and reproduces the letter always in the same (clockwise) manner. He adheres to his method with a hundred per cent rigidity. (Only in Response 9 of the first session is there a minor deviation.) He is extraordinarily systematic, pedantic and rigidly methodical.

Clinically, this 40 year old man suffers from a prolonged rheumatic heart disease with stenosis of the mitral and aortic valves. He became a psychiatric problem because of his excessive worry and concern over his physical condition. He does not work because of fear of a heart attack.

Case 4 was an example in which the main problem was an excessive worry about an organic condition. Case 5 is another example of such a situation.

Case 5

Test Results of J. R.

First Session

1. K F X
2. N W R H
3. N H Y M
4. P C T L
5. P V D C X
6. X J B
7. Z F C P
8. X R Y S
9. X S F H
10. W T N H L
11. N P K R
12. D V T L

Second Session

1. V F K R T
2. M Y K S
3. J B T W M
4. C X B
5. W P B V
6. F B W T
7. N K Z L
8. L Z C H M
9. K F R W
10. N D F Z S
11. F Z X J
12. P X H D

The total number of errors is a normal average and she is probably even more alert than these results would indicate. She makes only one substitution (X instead of Z in Response 5) in the first session and none in the second session. This indicates a very pedantic accuracy.

In the responses the initial letter is the left upper one and the pattern is clockwise. The patient adheres to this method with hundred per cent accuracy.

The distribution of errors is somewhat uneven: the patient is definitely able to reproduce five letters correctly but on several occasions she reproduces only three. The poorer responses are, however, not distinctly related to the difficulty of the task.

This 35 year old woman was injured in an accident two and a half years before she came to the Clinic and since that time the right side of her face underwent an atrophy. The patient was sent to the psychiatric clinic because she had much worry and anxiety about this condition and became nervous. Beside this problem the psychiatric exploration revealed conflicts and guilt feelings about sexual matters and also some compulsive trends. Thus, in this case we see a combination of excessive worry about a physical condition and a somewhat obsessive type of personality.

While in the case of Sh.B.B. there was an obsessive fear of illness (tuberculosis) without any objective basis, in the cases of G.S. and J.R. there is an actual physical illness or deformity with excessive worry about it. The test results in the two types of cases--as far as can be seen--cannot be distinguished. It is somewhat problematic what the psychological relationship between these two types of conditions may be. Two possibilities suggest themselves. It is conceivable that an excessive concern over a physical illness is just as much a mark of a rigid, obsessive type of personality as an obsessive fear without any objective foundation. Another possibility is that rigid personalities are apt to develop various types of psychosomatic diseases. For some cases the first, for some others the second hypothesis seems to be more fitting. Among the physical illnesses of which these patients suffer there are also such conditions as facial paralysis caused by nerve injury, hernia of the nucleus pulposus, etc. which cannot be considered as psychosomatic diseases proper; for such cases the first explanation may be valid. There are, however, in this "rigid" group some cases in which not so much the concern over physical illness but an actual psychosomatic disease itself is the outstanding feature. In these cases one may reasonably suspect that the rigid personality offered a favorable background for the

development of the physical illness. The remaining three examples which we wish to quote in this section should serve as illustrations of rigidity in the test results of patients which suffer from certain forms of psychosomatic diseases.

Case 6

Test Results of G. S.

First Session		Second Session	
1. F K X	7. F C P V	1. F V K	7. K N L Z
2. W N R	8. R X Y	2. Y M K	8. L C M
3. H N Y	9. S X F	3. B J T	9. F K R
4. C P T	10. T W N L	4. X C B	10. D N F S
5. P V D	11. P N K W	5. P W B	11. Z F K
6. J X B	12. V D T	6. P F W T	12. P H D

The patient has a total number of errors of 21 in each of the two sessions. This is, however, due to her very cautious attitude rather than to diminished alertness.

There is only one substitution error (V instead of Z in Response 7) in the first session. All theother errors are omissions indicating that the patient is very accurate and cautious.

Examining the distribution of errors over the various responses there is a rather marked evenness in evidence. She limits herself in an overcautious manner in almost all her responses although she is able to report at least 4

letters correctly.

She prefers to start with the uppermost letter and she follows a reading pattern. She follows this pattern very consistently deviating from it only twice in the first session (Responses 5 and 7) and only once (Response 7) in the second session.

Clinically, this 30 year old married woman is suffering from neurodermatitis disseminata of six years duration which is becoming progressively worse. There is intense itching and the skin is cracked and bleeding. There is an exacerbation of the symptoms whenever she is nervous, tired or irritated. She had an unusual dread of itching during her childhood. Another outstanding psychological feature is that she is extremely inhibited in matters pertaining to sex.

Case 7

Test Results of M. Mc. F.

In this case there was only opportunity for one experimental session with the patient but the results are rather clear cut.

First Session

1. F K
2. W N R
3. N H Y
4. P C T
5. P V D
6. J X B
7. Z F C
8. X R Y
9. X S F
10. W T H
11. N P K
12. D V T

The total number of errors is high, namely 26, but this again is due at least partly to patient's extremely cautious attitude. She always reproduces only three letters, never venturing beyond this limit.

All the errors are omissions; substitutions are entirely absent.

After the first two responses she settles on the clockwise pattern, maintaining it consistently for the rest of the session.

Clinically the chief problem in this 31 year old woman is asthma. Besides, she has many realistic worries being such a young widow with six children to take care of.

Case 8

Test Results of R. H.

First Session		Second Session	
1. K F X	7. Z F C B	1. V F K R	7. N K Z L
2. N W R	8. X Y M S	2. M Y K S	8. L C Z H M
3. N H Y	9. X F H	3. J B T	9. K F R B
4. P C T	10. W T N	4. C X B	10. N D F S B
5. P V D C	11. N P K R	5. W P B V	11. F Z X J
6. X J B H	12. D V T L	6. F B W T	12. P X H D

The patient makes a total of 20 errors in the first session and only 13 in the second session. Apparently he is more cautious at first. There is only a moderate amount of

shock on the difficult cards (Responses 3 and 4 of the second session).

Substitutions are few and not remote, two on the first session (Responses 6 and 7) and only one in the second session (Response 10).

The patient starts always with the left upper position, then proceeds in a clockwise manner. His consistency is almost hundred per cent and shows only one deviation (Response 8 in the first session).

Clinically, this 23 year old young man is suffering from a duodenal ulcer. The psychological situation is quite complex and hence cannot be reported in detail. The outstanding features are, however, a broken home with a resulting very chaotic family situation. Furthermore, the patient had taken the chief responsibility for the support of the family, trying to shoulder a greater burden than he possibly could carry.

Taking the rigid group of patients as a whole, we find in their test results the following features: 1) They show an average or a somewhat high total number of errors. 2) Practically all the patients in this group function considerably below their optimal capacity, due to 3) discouragement when the task is difficult ("shock"), or 4) setting their level of aspiration below their actual

capacity, e.g., the patient may limit himself to reproduce only three letters when he actually would be able to reproduce four or five. 5) Their overcautious attitude, their aversion for taking chances manifests itself also in the small number or complete absence of substitution errors. 6) They are extremely methodical and self-consistent: they begin practically always with the same position and reproduce the letters consistently in a fixed spatial order.

Clinically, the patients belonging to this group show one or the other of the following conditions:

1. Obsessional neurosis with obsessive fears as the outstanding complaint. It is interesting to note here that only patients who had a chronic obsessive fear of illness were found in this group, patients showing phobias which cause an acute fear in some specific situation (e.g., fear of closed spaces, fear of elevators, etc.) give an entirely different test result. The responses in these latter cases resemble those of the patients with anxiety states and will be discussed later.

2. Patients who suffer from some actual physical illness (most frequently cardiovascular) and become a psychiatric problem because of their excessive worry over their physical condition.

3. Patients with certain psychosomatic diseases.

If we count only the extreme cases altogether, 17 patients belong to the rigid group. A lesser degree of rigidity is, however, quite frequent. There is a definite prevalence of males in this group: 12 men and only 5 women. It may be noted here that patients with hysterical conversion symptoms, but without much free anxiety are almost as rigid as the patients belonging to this first group. They will be discussed in the next section.

It may be recalled that we have found also among the schizophrenics one group of patients, the paranoids, who showed what we considered signs of rigidity in their test results. Thus the question arises whether or not the paranoid schizophrenic patients can be distinguished on the basis of their test results from the "rigid" patients described in this section.

If one considers only the high consistency and the low number (or absence) of substitutions, these two groups cannot be clearly differentiated from one another. On the other hand, there is one feature which is almost constantly present in the rigid outpatient group but is rarely seen in paranoid schizophrenics. This feature is the shock involved in a difficult task. It seems plausible to assume that the shock is not directly related to the personality feature of rigidity but rather it is a sign of

a certain type of neuroticism. At any rate on the basis of this feature the two groups of patients in most instances can be distinguished. It is possible that with greater refinement of the technique of interpretation more accurate differential diagnostic criteria may be worked out in the future.

This consideration leads us to a problem which has been frequently discussed in the literature of the Rorschach test. Do the test results reveal abnormality or do they rather reveal certain normal personality characteristics? In other words, is the test a tool for diagnosis of disease entities or is it a tool for personality diagnosis in general? This question cannot be answered with certainty at the present. The problem must be considered separately with regard to each feature of the test result. With regard to rigidity our experience suggests the following hypothesis: rigidity as revealed by this technique is--within limits--a personality characteristic which may occur in many people who do not suffer from any psychiatric disorder. When rigidity is present in extreme degree if predisposes the person for certain types of disorders: paranoid schizophrenia, obsessional neurosis or certain forms of psychosomatic diseases. Since patients belonging to these various diagnostic categories are all rigid, there must be some additional causes which are responsible for the

fact that one rigid person develops paranoid schizophrenia, the other an obsessional neurosis, the other again a peptic ulcer while some may remain just extremely pedantic people without developing a definite psychosis or neurosis.

B. Group II. Outstanding feature: Signs of loose personality organization.

The test results of the patients classified in Group II are in some respects diametrically opposite to those of Group I. The two most outstanding features are a very low pattern consistency and, to a lesser extent, a higher than average number of substitution errors.

The patients to be discussed in this section clinically show acute anxiety and tension states, anxiety-hysteria, conversion hysteria and hysteria with both anxiety and conversion symptoms.

A. First we wish to give three examples of the test results of patients who clinically showed anxiety as their outstanding symptom.

Case 9

Test Results of D. N.

First Session

1. F Y K
2. W N H R
3. H Y N P
4. C P T L
5. V P D O
6. J K X L
7. F X C Z
8. R X Y F S
9. S F X M H
10. T W L N H
11. P N K H
12. V D T L

Second Session

1. V F K T
2. Y M S K
3. B J T Y
4. X C Y B
5. P W Y B X
6. B F T W
7. K N L Z
8. L Z C M H
9. K F T B R H
10. D N F S Z
11. Z F X H
12. X P H D

The patient makes 18 errors in the first session which is somewhat more than average. This does not seem to be his optimum, because he reports several times 4 and once even 5 letters (Response 10) correctly. In the second session he makes actually only 11 errors which is slightly better than average. Thus his speed is not impaired.

Striking is the high number of substitution errors, particularly at the first session. In the first session he reports 8 letters wrong (Responses 1,3,5,6,7,8,9,11), in the second 3 (Responses 3,5,9). In the majority of instances the substitution is the last letter of the response; that is, the patient is apparently anxious to do well, takes chances at the expense of accuracy and reports also letters which he perceived only vaguely.

With regard to the position of the starting letter he is fairly consistent, but this factor--as mentioned earlier--

has a rather limited value for personality diagnosis. On the other hand, the pattern consistency which is a very important diagnostic sign is extremely low. There are contraclockwise, reading, grouping and many irregular patterns present, but there is no predominance of any one pattern. The patient's responses are unsystematic, haphazard.

Clinically, this 32 year old man was diagnosed as anxiety neurosis. He came to the Clinic with complaints of anxiety attacks characterized by palpitation, nausea and fear of dying.

We shall see that in all patients showing test results similar to those just described, anxiety and tension are the most outstanding clinical symptoms.

Case 10

Test Results of M. F.

First Session		Second Session	
1. F K J X	7. F Z	1. F V K	7. K N Y Z
2. W R N	8. R X Y D	2. Y M K S	8. S L F A Z
3. H M W N Y	9. Z X J F	3. B J K M	9. F K T B
4. C P T	10. T W L H N	4. X C Y S R	10. D N F
5. V P Z T D	11. P K Z D	5. P X V B	11. Z F B K
6. J X K B	12. V D L T	6. B F T W	12. X P D H

The patient makes 17 and 18 errors in the first and second sessions respectively. This is just moderately above the normal average but is within the normal range.

There is a distinct unevenness in the distribution of errors, particularly in the first session, the number of letters reproduced correctly ranging from 2 to 5. The poor responses are not related to the difficulty of the task, nor do they indicate initial blocking. The disturbing factor is not in the external situation, but is apparently of endogenous origin.

The accuracy of apprehension of environmental stimuli is impaired. In the first session there are 4 substitutions (Responses 5, 8, 9, 11) and in the second session there are 6 (Responses 3, 4, 7, and three in Response 8).

She is consistent with regard to the starting point, but her pattern consistency is very low. This is particularly true in the first session. Some of the patterns are rather irregular and not clearly classifiable. At the second session she comes closer to normal consistency, eight of the responses being of the same pattern (contra-clockwise pattern).

There is indication of eagerness or haste expressed in "skipping of letters" as in Responses 2 and 3 of the first session.

Clinically, this 36 year old colored woman complains

of anxiety attacks which were precipitated by a recent situation when she was supposed to testify in court against another woman, much against her wish. She complains of palpitations, oppressions, insomnia, fear of the dark and a feeling of being smothered. (Later a physical examination revealed that she was pregnant; she said that she did not know about it.)

Case 11

Test Results of L. J.

First Session		Second Session	
1. K F B J X	7. Z C P	1. F K T R Y	7. N L K Z
2. N W R H	8. R Y S M X	2. M S K Y	8. Z L M H C
3. M N W R	9. S Z H F	3. B T J M	9. T W F R
4. C T R V D L	10. W L N T H	4. C Y B H S	10. N S F D
5. Z P D V C	11. W N R D	5. W X P V B	11. K B X J T
6. J X B K	12. V T D L	6. F T W B	12. P D H X

The total number of errors is 8 in the first session and 7 in the second session indicating a considerably better than average speed of reaction. There is probably high intelligence. The distribution of errors is normally even. She makes one substitution in the first session (Response 4) and 3 in the second session (Responses 1, 4, 11) which is within normal limits.

The outstanding deviation in this patient is the extreme inconsistency both with regard to the position of

the starting letter and even more with the reproduction of the spatial pattern.

Clinically, this 22 year old girl complains of a great many fears: to enter busses, elevators, subways, fear of high places, bridges. The condition is said to have been precipitated by an assault on her by a drunken man. The patient was diagnosed by the psychiatrist as a case of anxiety hysteria.

The test results in this case differ from the two previous cases in that this patient does not show an increase of substitutions above the normal average. In general we have found that in those cases in which clinically there is acute anxiety or fear present, the pattern consistency is always markedly low. On the other hand an increased number of substitution errors, though it is quite frequent, is a more inconstant accompaniment of anxiety.

B. Next we will give two examples of hysteria with both anxiety and conversion symptoms. The test results of these cases show great inconsistency but the substitution errors are less than in the normal subjects and in this respect they differ from those cases which show only anxiety symptoms.

Case 12

Test Results of F. Ch.

First Session		Second Session	
1. K F B J X	7. Z F C P	1. F V K T R	7. N K L Z
2. W N R H	8. X R Y M S	2. M Y K S	8. L Z L M
3. N H R X	9. X S F C	3. J B T L W	9. K F T R W
4. P D C T	10. W T N L H	4. C X Y B	10. N D F S Z
5. Z C W D	11. N P K W D	5. X V W P B	11. B F X K
6. X J B K	12. D V T L	6. F B W T	12. P X D H

The total number of errors is 10 and 8 in the first and second session respectively. This is a better than average speed. She has in the first session 2 substitutions (Responses 3 and 4) and in the second session only 1 substitution (Response 8); a normal ratio.

The consistency with regard to the starting letter is somewhat low, with regard to the pattern very low. Several types of pattern--clockwise, reading, grouping and more or less irregular patterns--occur with no distinct preference for any type. It may be noted that there are several grouping patterns present which together with the low total number of errors is a rather reliable sign of high intelligence.

Clinically, this 32 year old woman was ill for two and a half years before she came to the Clinic. Most of

her symptoms started at the time of her engagement and became much worse after 6 months of married life. She has crying spells, syncoped attacks, numb creeping sensations in her hands and breasts, nightmares, panicky feelings and many aches and pains. She likes to talk about her symptoms.

Case 13

Test Results of F. B.

First Session		Second Session	
1. K F J X	7. Z P C F	1. V K F M	7. N K Z L
2. N W R	8. X R Y M S	2. M K Y S	8. L C Z
3. N H Y M	9. X F S H	3. J B T W	9. K F R W S
4. P C T L	10. W T N S	4. C X B	10. N D F S
5. P V D C	11. W D R K	5. X V P W	11. F X J Z
6. K X B J	12. D V T L	6. F B W T	12. P D X H

The total number of errors is 13 in the first session and 15 in the second--indicating normal speed. The distribution of errors is fairly even; no initial blocking and no shock on the difficult tasks is present.

The patient is rather accurate, having only one substitution in the first session (Response 10) and two in the second (Responses 1 and 9). This is somewhat less than in the average normal subject. She is fairly consistent with regard to the position of the starting letter. The most marked deviation from the normal in this patient is the low pattern consistency.

Her preference is apparently for the clockwise pattern, but this pattern is only five times used in the first session (Responses 2,3,4,5,12) and six times in the second (Responses 3,4,6,7,9,10).

Clinically, this 36 year old woman shows the picture of hysteria with both conversion and anxiety symptoms. Her symptoms consist of air hunger, gasping, trembling, difficulty in swallowing. She is afraid to travel along even a few blocks. As a child she wet the bed up to the age of ten and even in childhood had the complaint of not getting her breath. As a child she watched intercourse between the parents and held her breath in order not to be discovered.

C. The test results obtained in the cases of conversion hysteria without free anxiety do not properly belong to this Group II. However, since anxiety hysteria and hysteria with a mixture of conversion and anxiety symptoms were discussed here, the problem of more or less pure conversion hysteria may be taken up in this section. The test results in conversion hysteria approximate the rigidity found in Group I. They show high consistency and usually a low number of substitution errors. They can usually fairly well be distinguished from patients belonging to Group I because the rigidity shown in the test results is not so extreme; sometimes the number of substitutions is higher than in the patients of Group I. The following

example may serve as illustration:

Case 14 Test Results of A. R.

First Session		Second Session	
1. K F X	7. Z X C	1. F K	7. N K Z T
2. N W R	8. X B Y	2. Y K M	8. L J M Z
3. N Y R	9. X S F	3. J B T	9. K F R T
4. P C T	10. W T N	4. S B K	10. N D F
5. P V D	11. N P B	5. W P B	11. F Z K
6. X J B	12. D V L	6. F B Y	12. P X H

The number of total errors is 28 and 26 in the first and second session respectively which is definitely high. The patient may be of low intelligence or an element of depression may be in the picture which--as we shall see later--is often responsible for a decreased speed. The particular type of distribution of errors may also contribute to the high total number of errors. In the first session the patient rigidly limits himself to three letters, the distribution in the second session is not quite as even. The type of distribution may mean a self-imposed limitation of aspiration and the fixation of the goal at a rather low level.

He has three substitutions in the first session (Responses 7, 8, 11) and four in the second session (Responses 4, 6, 7, 8)--this is somewhat high.

The consistencies, particularly in the first session,

are very high. The position of the starting letter is one hundred per cent consistent in the first session; in the second 10 out of 12 are of the same type. In the first session the pattern of spatial order is the same in all responses with only a minor deviation in responses 3 and 12, due apparently to skipping of letters. Also in the second session the pattern consistency is high although there are a few minor deviations and there is one definitely irregular pattern (Response 8). The high consistencies would place this patient in Group I, but he has too many substitutions for such a classification.

Clinically, this 38 year old man is diagnosed as conversion hysteria. He suffers from attacks during which he is unable to bring out the desired word. During the attack he retains consciousness, but is unable to speak, though he knows what he wants to say. His mouth opens widely and he grunts inarticulately. At the same time he has diplopia and staggers as if drunk. (According to previous psychometric tests the patient is of dull normal intelligence--which is interesting in view of the fact that he has a high number of errors on the test.)

Summarizing the results of Group II, the outstanding characteristics of the responses are low pattern consistency, indicating disturbed organization, unsystematic, haphazard way of reaction and increased number of substitution errors

which indicates lack of accuracy, diminished power of environmental stimuli to guide the patient's behavior, increased subjectivity. Both these features of the test results indicate a loosening of personality organization.

Clinically, the common denominator in all these cases is the acute anxiety which has at least temporarily a disrupting disorganizing effect on the patient.

According to their test results the patients can be arranged in the following series: anxiety state and anxiety hysteria--hysteria with both anxiety and conversion symptoms--conversion hysteria. One end of the series shows the greatest amount of disorganization which decreases going towards the other end, so that finally in conversion hysteria rigidity is actually present.

It is apparently free anxiety which has such a disrupting effect on personality organization while conversion and fixation of anxiety creates a transformation into a narrow, rigid type of personality organization. On the other hand it may be that in an originally rigid personality anxiety tends to become fixed and converted, while in a very loosely organized person such transformation of free anxiety does not take place.

As mentioned already, the two outstanding features in the test results of Group II are the low consistency and to

some degree a high number of substitution errors. There are other signs also which occur frequently in this group. It is striking that initial blocking and shock on the difficult card do not occur in this group while it was very frequent in Group I. This may appear at first sight paradoxical in view of the acute emotional disturbance present in the clinical picture. The patients of Group II, however, present frequently what we called an endogenous shock or disturbance. Thus the accomplishment of these patients is adversely influenced by inner impulses and possibly because of these same inner difficulties they are less sensitive to situational difficulties. While in acute anxiety the inner upheaval is the outstanding factor, in obsession and conversion there is a definite, though inefficient attempt at adjustment to the situation.

It may be noted finally that a type of hasty attitude as revealed on the test by skipping of letters is fairly characteristic for Group II as a whole.

In examining the hebephrenic patients we have found that they have a high number of substitutions and low consistencies and in this respect they resemble patients with anxiety as an outstanding symptom. The differentiation of these two groups usually is not difficult because the hebephrenic patients show the above mentioned signs of loose personality organization in a more extreme form than

the patients with anxiety neurosis. Particularly the tendency to make substitutions is much more marked in the hebephrenics. There is, however, a narrow area where the two groups overlap and hence the differentiation occasionally may be difficult.

We may ask with regard to the signs of loose personality organization whether they indicate a normal personality trait or whether they are signs of pathological disturbances. We feel that these signs, if present in a marked fashion, are signs of a disturbance rather than a variation of personality make-up. The following observation is in favor of this interpretation.

We have mentioned in the first part of the study that the test results obtained at different sessions are highly consistent with each other. In general, also, the outpatients were found to be rather consistent from session to session. We have, however, seen in these later groups several cases where in one session the signs of loose personality organization were present while in the other session these signs were absent or even signs of rigidity appeared. By checking with the psychiatric notes it was evident in the majority of these cases that at the time of one examination the patient was in a state of anxiety while during the time elapsed between the first and second examination this condition subsided. This observation makes

it probable that marked signs of loose personality organization may not be related to a basic personality trait but that they rather indicate the presence of a disorder.

C. Group III. Outstanding feature: High total number of errors.

Among the outpatients there is a group in which the most outstanding feature is a high number of total errors. These patients reproduce very few letters, often only 1 or 2 in each response. The following examples will illustrate this:

Case 15

Test Results of E. H.

1. K F	7. F Z	1. V T	7. N K
2. N W	8. X	2. N Y	8. L Z
3. N H	9. X S	3. J B	9. F K
4. P D C	10. W T	4. C X	10. N D
5. P V Y	11. N P	5. W P	11. P Z
6. X J	12. D V	6. T B	12. P X

The outstanding deviation from the average is the high number of total errors: 36 in the first session and 37 in the second. The test results show a normal consistency of pattern. On one session there is one, on the other there are two substitutions.

Clinically, this 65 year old woman has numerous vague

somatic complaints but the outstanding symptoms are depression and a feeling of tiredness.

Case 16

Test Results of W. J.

First Session		Second Session	
1. F P	7. K L	1. F B	7. F P
2. Y S	8. Z M	2. W R	8. M Y
3. B M	9. F B	3. Y	9. S C
4. K S	10. D S	4. C V	10. T L
5. W B	11. S K	5. D P	11. P D
6. B T	12. X D	6. X B	12. V L

In this case again the outstanding feature is the high number of errors: 38 in the first session and 37 in the second. In order to see whether the patient's responses would show some improvement if sufficient time is allowed a third session was held with the patient in which the exposure time was increased from the usual 0.5 sec. to 1 sec. Her test results showed, however, only a slight improvement, a decrease of the number of errors to 33. There are few substitutions: 2 in the first session and only 1 in the second. The pattern and its consistency are difficult to determine because of the few letters in each response.

Clinically, this 55 year old woman has numerous vague bodily complaints. She is afraid to take even short trips

away from home, being afraid that she would fall down in front of a street car and be killed. She is rather depressed.

Case 17

Test Results of M. J.

First Session		Second Session	
1. J	7. F	1. F	7. N
2. N	8. R X	2. M K	8. M H
3. H N	9. S X	3. B	9. F R
4. C P	10. T N	4. S	10. N D
5. D	11. N K	5. P B	11. K
6. X	12. D	6. B	12. D H

The total number of errors is extremely high: 42 in each of the two sessions. Substitutions are absent. The consistency of pattern cannot be determined because the subject responds often only with one letter, but the consistency is presumably low, because she is rather inconsistent even with regard to the position of the starting letter.

Clinically, this 50 year old woman is said to have been "nervous" all her life and had some sort of a "nervous breakdown" nine years ago. Recently she stopped menstruating. She became depressed and developed paroxysmal nocturnal dyspnea with precordial pain and palpitation. She also complained of shooting pains in various parts of her body.

She has been diagnosed as "Mixed Psychoneurosis (Menopausal syndrome)".

In the majority of cases which show an unusually high number of errors (mostly omissions) two points stand out clearly: 1. These patients belong to a higher age group, and 2. there is some degree of depression in the clinical picture. On the basis of the available data it is impossible to tell whether in these cases the age factor or the depressive feature is responsible for the decreased speed of reaction as revealed in the high number of errors. Most probably it is a combined effect of both factors.

It is reasonable to assume that the age factor plays a considerable part. It is known that the speed of reaction in general decreases with age. Our material does not lend itself well to compute the correlation between age and total error. The majority of the patients in this investigation had in many respects severe deviations from the average and these abnormalities cover up the age factor. It would be desirable, however, to establish standards of speed on this test for various age groups in the general "normal" population.

It is rather plausible that the depression in part, at least, is responsible for the reduction of the number of letters reproduced by the patients. It is known that many psychological functions are considerably slowed down in

depressive states. The separation of the two factors--age and depression--and assigning to each of these factors the proper weight is not possible in the majority of our cases. We have, however, examined a few relatively young patients suffering from depression and in these cases we also found a high total number of errors, suggesting that depression alone also may reduce the patient's alertness.

Case 18 will illustrate this.

Test results of A. R.

First Session		Second Session	
1. F M	7. F Z	1. F V	7. K N
2. W V	8. R X	2. J M	8. Z L
3. H	9. Z	3. B Y	9. F M
4. C P	10. W L	4. X Y	10. D N
5. B P	11. N W	5. P W	11. Z F
6. J H	12. V D T	6. F W	12. N P K

The total number of errors is very high: 40 in the first session and 38 in the second. There are 3 substitutions in the first and 5 in the second session, all other errors are omissions.

In spite of the fact that the patient reproduces so few letters in each response the preferred pattern (contra-clockwise) can be readily detected. She tends to be consistent.

This 37 year old woman is said to have had a severe

nervous illness at the age of 23, characterized by depression. She was referred to the Psychiatric Clinic two yearsago because of depression and suicidal thought. Under psychotherapy she improved considerably. However, a few months before this test was given she again returned to the Clinic with similar complaints.

We have certain indications that not only depression and age but also intelligence influences the total number of errors. That such may be the case was first suspected on the basis of the distribution of the total number of errors in a group of 31 normal control subjects. This group was composed mainly of college students and hospital attendants. There was some tendency for the college students to cumulate towards the lower end in the distribution curves (see Fig. 1). It was thought that this may be due to a generally higher intelligence level of the students. However, the sample was not large enough to establish a reliable correlation and in addition the students on the whole belong to a somewhat younger age group.

A consideration of the extremes of intelligence levels in our patients again suggests a negative correlation between total number of errors and intelligence. The following two examples may serve as illustration.

Case 19

Test Results of S. M.

(In this case only one session could be held with the patient.)

First Session

1. K
2. R
3. W
4. D
5. D
6. J P
7. C
8. X
9. E
10. U W
11. R
12. D

The patient made a total of 49 errors, that is, she reproduced only 11 of the 60 letters exposed. Among the errors there are 8 omissions and 3 substitutions. It is interesting to note that on those two occasions when she tries to reproduce more than 1 letter (Responses 6 and 10) she makes a substitution which suggests that it is definitely beyond the capacity of the patient to reproduce more than one letter.

Since there are so few responses the pattern consistency cannot be determined. It must be low, however, because the few letters reproduced have no constant spatial position but the patient rather picks out a letter once here and once there.

Clinically, this 36 year old woman shows generalized

mental deficiency. Her I. Q. is 49. She has come several times to the Clinic for the last 13 years with complaints of headache, spells of involuntary crying and laughing and a number of conversion symptoms.

In sharp contrast to the preceding are the results obtained in the following:

Case 20

Test Results of A. K.

First Session		Second Session	
1.K X J B K	7.F Z P C	1.F K R V T	7.K Z L M
2.W N H R	8.R Y S M X	2.Y K S M	8.C Z H M L
3.H Y N M R W	9.S F C X H Z	3.B T W J L M	9.F R W K T B
4.C T I P V D	10.T N H W L	4.X B K S M Y	10.D F Z N S
5.V D C Z P	11.P K N R W D	5.P B V W X	11.F X J K Z R
6.J B X K	12.V T L D	6.B W T F	12.X H P D

In the first session there is only one error, a substitution in Response 1; in the second there are two errors, one in Response 4 and one in Response 11. All the other letters are reported correctly.

Two weeks later we have reexamined this patient, shortening the exposure time from the usual 0.5 sec. to 0.25 sec. Even under these conditions she did very well, making only 3 errors in the first and 4 in the second session. The other features of the test results are not particularly relevant in this connection.

This 16 year old girl is of very superior intellectual endowment. Even at the age of 6 she was intellectually very superior, obtaining an I.Q. of 185. She was brought to the Clinic because she presented a behavior problem characterized mainly by overactivity and emotional instability.

The last two cases represent the extremes of intelligence level among our subjects. We had the impression that the inverse relationship between intelligence and the total number of errors holds true in general also in the middle ranges. Since, however, the great majority of the subjects were suffering from nervous and mental disorders which in themselves influence the total error, our material is not suitable for establishing the exact relationship between total error and intelligence.

In this connection we may mention another feature of the test results which we feel may be related to intelligence. This is the use of the grouping pattern. In this case the subject divides the exposed letters into two groups. This tendency is most marked in cards with 5 and 6 letters. The most frequent grouping is the following: 5, 1, 2, 4, 3; 6, 1, 2, 5, 4, 3; in such cases the cards with 4 letters may be reproduced as 4, 1, 2, 3 (see p. 22). It is a well known psychological fact that a person can perceive in a given short time a larger number of single items if he divides

them into groups. Those subjects who use the grouping pattern are actually using the more efficacious method for the solution of the type of problem presented by the test. We have observed that this pattern occurs only in subjects having rather high intelligence.

In summary, probably many features have an influence upon the total number of errors. Among these, intelligence level, depressed mood, and age seem to be the most important ones. Thus far it was not possible to determine the respective weight of these various factors.

D. Group IV: Outstanding Feature: Perseveration.

This group consists only of 7 patients but they will be discussed in some detail because of the rather important diagnostic features which their test results reveal.

In testing subjects belonging to various categories (normals, schizophrenics, psychoneurotics) it was found that in general the successive responses in one session have practically no influence upon each other. In a small number of cases, however, there was a distinct tendency toward perseveration of letters from one exposure into one or several of the succeeding responses. The particular forms of perseveration will be discussed further below when we will analyze several such test results.

The perseverative tendency was first noted in working with schizophrenic patients. In a small number of schizophrenic patients marked perseveration was present in the test results. It was striking that all these patients had one clinical feature in common: they all showed some psychomotor symptoms in the form of repetitive, sometimes ticklike manneristic movements. The number of cases among the schizophrenic patients which showed perseveration was, however, so small that a significance of the relation to the clinical symptoms could not be claimed.

Among the psychiatric outpatients there were several patients who showed perseveration in their test results. It was very striking to find that all these cases--with the possible exception of one--showed some motor disturbances: convulsions, ticks, disturbance of speech. On the other hand, there were no patients examined in the group who would show these clinical features but who would have no evidence of perseveration in their test results. The relationship is so striking that it is most unlikely that it could be accounted for by mere chance. Obviously, the problem requires further study.

Case 21

Test Results of M. H. [6]

First Session		Second Session	
1. $\underline{F}$ B K $\underline{J}$	7. F $\underline{\underline{J}}$ C $\underline{\underline{K}}$	1. F V K R	7. K N Z L
2. W $\underline{\underline{F}}$ R $\underline{\underline{J}}$	8. R X Y M S	2. Y M $\underline{K}$ S	8. Z L C H M
3. H N Y	9. S X F C	3. B J $\underline{\underline{K}}$ T M	9. F K R T
4. C P T	10. T W N H	4. K C $\underline{\underline{K}}$ $\underline{Y}$	10. D N F S Z
5. V P D B C	11. P N K W	5. P W $\underline{\underline{K}}$ $\underline{\underline{Y}}$	11. Z F X B
6. $\underline{J}$ X B $\underline{K}$	12. V D T L.	6. B F W T	12. X P H D

The total error is about average. (17 and 13 on the first and second session respectively.) In the first session there is evidence of shock at the difficult cards (No. 3 and 4). The consistency is about average with a tendency toward rigidity in the first session.

There are 7 substitutions of which 6 are due to perseveration. There are several features in these test results which are rather characteristic for the cases in which perseveration occurs. It will be worth while to point out specifically these characteristics; they are helpful for differentiation in borderline instances where there may be doubt whether the phenomenon observed is actually perseveration or a chance occurrence.

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[6] The perseverations are underlined twice, the original letter which starts the perseveration process is underlined once.

1) The relative number of perseverations is high: 6 out of the total of 7 substitutions. It is practically impossible that this could be coincidence since it occurs in such a large percentage of the patient's substitutions.

2) Mostly the first or the last letter of the response is the one which perseverates into the succeeding response: in the first session F and J perseverate from the first response, J and K from the sixth response; in the second session Y from the fourth response. This peculiarity may be related to the fact--as seen, for example, in psychological learning experiments--that the endpoints of a series tend to impress themselves most firmly on one's memory.

3) Another peculiarity is that the letter which perseverates tends to occupy the same spatial position as the original letter. In the case of M. H. we see that in the first session in Response 2, J is the fourth letter just as it has been in Response 1, the same is true of K in Response 7; in the second session the perseverating K in Responses 3, 4, 5 all occur in the third position just as the original K in Response 2.

4) The perseveration of K in the second session brings out a further point. We see, first of all, that K continues to perseverate through three responses. When such rows of perseveration occur, we have a further assurance that the repetition of the letter is not a chance occurrence.

Secondly, in the example given we have a plausible explanation why the perseveration occurs strongly exactly at that point. We see that in Responses 1 and 2 there is actually a correctly reproduced K in the third position, so that the perseverative tendency is reinforced by this fact. Under such conditions even a person without any extreme tendency towards perseveration may show some perseveration but it would not be carried through three responses.

This last observation suggests a possibility for developing a method for the detection of lesser tendencies and finer nuances of perseveration by arranging the letters on the exposure cards in such a manner that the perseverative tendency is stimulated to varying extents.

The clinical data on this 15 year old girl are briefly as follows: she was brought to the Clinic a year ago with the complaint that one month previously, while the patient was eating, she suddenly stopped with her fork in mid-air, her eyes blank and staring and not responding to speaking or gentle tapping. This lasted about one minute, then she went right on eating, but seemed confused and tired. After 10 minutes sleep she felt better and had complete amnesia for the entire episode. Within one month that followed she had 62 further episodes, 1 to 5 daily. They occurred at any time and during any activity. There was no aura, no deviation of the eyes, no tongue biting. On two

occasions she was incontinent of urine. Observation at the New York Neurological Institute revealed vasomotor instability and electroencephalographic variations characteristic of convulsive disorders as the only abnormalities. Psychometric examinations revealed average intelligence. The findings on the Rorschach Test (given by Dr. Z. Piotrowski) did "not seem to indicate any personality changes which are characteristic of a cerebral organic disorder... On the other hand, there is strong indication of an hysterical psychoneurotic personality."

Case 22

Test Results of G. P.

(It was possible only to have one session with this patient)

First Session

1. F K X
2. N W R K
3. H N Y K
4. P C T V L
5. P V D
6. X S B K
7. Z F C P
8. X R Y M
9. X S F
10. W T H K N
11. N P K
12. D V T L

The total error is 18 which is somewhat high, but probably this is not optimal in view of the unevenness of distribution of the errors. The consistencies are normal.

The evidence of perseveration on the basis of a single

session is less clear here than in the preceding case. However, the letter K in Response 2 and 3 is apparently a perseveration from Response 1. Whether the K in Response 10 is a late effect of the same perseveration is questionable.

This 28 year old woman had, at the age of 15 years, a convulsive attack accompanied by loss of consciousness, frothing at the mouth and rigidity of the limbs. One maternal aunt suffered from similar symptoms. Two years preceding the convulsive epidode the patient began to have attacks of screaming, saying that she could not breathe and often experienced a feeling of approaching death. When she was 19 years old she came to the Clinic again with the complaint of many convulsions during the last three months. She was discharged six months later after having had no convulsions for a considerable period of time. The last time she came to the Clinic to obtain information as to the possibility and advisability of having children.

Case 23.

Test Results of A. P.

First Session		Second Session	
1. B K $\underline{V}$ J	7. P E F $\underline{C}$	1. E V $\underline{T}$ K	7. L M Z
2. H $\underline{\underline{V}}$ W	8. M X D $\underline{\underline{C}}$	2. S M $\underline{\underline{T}}$ K	8. M L Z
3. R W H	9. C X M $\underline{\underline{C}}$	3. M L T E	9. B T $\underline{K}$ $\underline{\underline{Z}}$
4. V D C A	10. L W T A	4. S Y C H	10. S N $\underline{\underline{K}}$ Z
5. Z B V $\underline{C}$	11. D $\underline{W}$ M N	5. $\underline{X}$ W	11. $\underline{K}$ B R
6. K X J $\underline{\underline{C}}$	12. L $\underline{\underline{W}}$ V	6. T F B $\underline{\underline{X}}$	12. D P $\underline{\underline{K}}$

The total error is very high (30 and 29) with uneven distribution. The number of substitutions is extremely high, 14 in the first session and 10 in the second. There is considerably high constancy of pattern. Such a picture we saw previously in cases of schizophrenia with a combination of both paranoid and hebephrenic features. Our present interest is the high number of perseverations of this patient: 5 in the first session and 5 in the second.

The patient is a 39 year old man who came to the Clinic with various complaints, especially of an intermittent headache since childhood. The pain feels like "bubbles rising in water." The patient complains of an involuntary twitching of his left arm when he lies down with his arm across the abdomen. If he places the arm at his side or above his head the twitching stops. Patient also stated that as a child he had "fainting spells". His psychiatrist thinks that they could have been of epileptic or hysterical nature.

In the following three cases the outstanding psychomotor disturbance consists of speech defects.

Case 24

Test Results of E. L.

First Session		Second Session	
1. K F R	7. P C F R	1. F V K R	7. K N Z R
2. W N R	8. R X Y C A	2. Y M K S	8. Z L C
3. W N Y F R	9. S X R A	3. V K T M S	9. F K R M C
4. C P T	10. T W N R	4. K C B V R	10. D N F J C
5. W P D	11. P N K C	5. P W K X R	11. Z F X R C
6. J X B R	12. V D T	6. B T W R	12. X P H D

There is high total error (25 and 22 in the first and second session respectively). Furthermore considerable consistency appears. The number of substitutions is very high, 10 in the first and 16 in the second session. In the general test results the patient shows a schizophrenic picture. The number of perseverations is 5 in the first session and 9 in the second session. Several of the other substitutions may also be perseverations.

This 20 year old girl came to the Clinic with the complaint of speech defect and for being self-conscious about it. She stuttered between the ages of 7 and 9. She overcame this, but since then she lisps and her speech is somewhat thick and slurred. She also showed overactive hand movements and trembling of the knees. She gave the impression of being very much out of contact with the real situation. In her speech there was a tendency to wander off. She also showed

compulsive handwashing, bathing and numerous obsessive-ruminative ideas, particularly of sexual content. The psychiatrist had the diagnostic impression of "obsessive traits in a schizophrenic personality."

Case 25

Test Results of D. M.

First Session		Second Session	
1. F H	7. Z F R	1. F T	7. K N T
2. W N R	8. R X M	2. Y M	8. Z L M
3. H N	9. S X Z	3. B J	9. F K L
4. C P D	10. T W L	4. X C Y	10. D N S
5. V P C	11. P N W	5. P W X	11. F B Z
6. J X R	12. D V L	6. B F T X	12. X P D

The patient 's total number of errors is distinctly high (29 on each of the two sessions). The number of substitutions is not too high (3 per session) and the consistencies are rather high--a combination which we have already seen in cases of conversion hysteria.

In the first session one of the three substitutions is a perseveration while in the second session all three substitutions are due to perseveration. In this patient one cannot expect a very high number of perseverating letters because he in general does not tend to substitute to any great extent.

The main complaint of this 36 year old man is stuttering,

whispering, hoarseness and aphonia. He had a minor speech defect ever since 1929 following a serious financial loss and reduction of social status. He was diagnosed as a case of conversion hysteria (aphonia).

The patient to be discussed next shows some interesting deviations from the other members of Group IV in his test results as well as in his clinical features.

Case 26

Test Results of M. L.

First Session		Second Session	
1. F B K L J	7. Z F C P	1. F $\underline{V}$ K R H	7. K N Z L
2. X N R H	8. R $\underline{M}$ Y $\underline{\underline{M}}$ S	2. $\underline{\underline{V}}$ M K S	8. Z L C M H
3. H N Y R	9. S X F H	3. B J T	9. $\underline{K}$ $\underline{\underline{K}}$ R T
4. C P T D L	10. T W $\underline{H}$	4. C $\underline{X}$ B $\underline{\underline{X}}$ Z	10. D N F S L
5. P D C Z V	11. P N R $\underline{\underline{H}}$ Q	5. P W B Y	11. Z F X B
6. J X B K	12. V D T L	6. B F W T	12. K P H D

The patient's alertness as revealed by the total number of errors (12 and 16 in the first and second sessions respectively) is normal average, but this is probably not his optimum due to the uneven distribution of errors. He is very inconsistent in the first session, more consistent in the second. There are several instances of skipping of letters indicating much haste. The number of substitutions is high (4 and 8). This is a typical picture seen already in cases with much acute anxiety and tension.

There are only 2 perseverations (first session in Response 11 and second session in Response 2) of the type we have seen before. There are, however, in addition 3 responses (first session Response 8 and second session Responses 4 and 9) where a letter repeats itself in the same response. This seems to be a variety of perseveration and one may almost say that the patient "stutters" in his responses. These perseverative features together with the evidence of great haste (skipping of letters) and the typical signs on the test characteristic for anxiety and tension parallel remarkably the patient's clinical symptoms.

This 21 year old man came to the Clinic with the complaint of nervousness of speech associated with nervous tension. Under conditions of stress or pressure the patient experiences a rapid flow of words which become all mixed up and cause him great embarrassment.

The last case in this series is presented for the sake of completeness because her test results show marked perseveration although the presence of motor or psychomotor symptoms--which is the common denominator of the group of perseverators--is somewhat questionable.

Case 27

Test Results of M. A.

First Session		Second Session	
1. Y K B $\underline{J}$	7. Y Z C $\underline{\underline{R}}$	1. V J K	7. K N Z $\underline{\underline{R}}$
2. W N R $\underline{\underline{J}}$	8. $\underline{R}$ M Y	2. Y M K $\underline{R}$	8. C L Z $\underline{\underline{R}}$
3. H N Y R	9. S C F $\underline{\underline{R}}$ Z	3. B T $\underline{\underline{R}}$ Q	9. K H $\underline{R}$
4. P C T J	10. T W N J M	4. X C B $\underline{\underline{R}}$	10. D $\underline{N}$ F $\underline{\underline{R}}$
5. P $\underline{V}$ D $\underline{\underline{V}}$	11. P $\underline{N}$ K M B	5. P $\underline{W}$ B $\underline{\underline{R}}$ $\underline{\underline{W}}$	11. $\underline{C}$ $\underline{\underline{N}}$ F $\underline{\underline{R}}$ Z
6. J K B $\underline{R}$	12. V T R $\underline{\underline{N}}$	6. B F W $\underline{\underline{R}}$	12. $\underline{\underline{C}}$ P H $\underline{\underline{R}}$

The total number of errors is high (28 in each session). The consistencies are markedly low. The number of substitutions are very high (12 and 17). Seventeen of the substitutions are definitely due to perseveration and some of the others may also be due to the same cause. On two occasions (first session, Response 5 and second session, Response 5) the repetition of letters occurs in the same response as it was in the preceding case (patient M.L.).[7]

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[7] It is striking that in this case particularly Letter R occurs with great frequency. This may mean more than perseveration and the letter may be connected with some personally important association. That this may be so is suggested by the test results of some other patients. The most striking evidence in this connection was observed in a case of an egocentric and extremely grandiose paranoid schizophrenic patient. His initials were J.H.D. He gave

This 39 year old married woman is a childish, infantile type of person. She complained of nervousness, various fears and showed much concern about ~~his~~ her physical condition. She complained also of headaches, fullness in the head, ringing in the ears, vertigo, nausea and occasionally a feeling of drifting into space. At the clinic for Oto-Laryngology where she was examined several times it was felt that "she most probably has Meniere attacks from vasomotor disturbances of the labyrinthic vessels. She was treated with nicotinic acid and thiamine chloride and under this regime the fullness in the head improved and the dizziness disappeared."

Though this patient does not have a motor symptom in the strict sense of the word she seems to have had difficulty--whether organically or psychologically conditioned--with the organ of equilibrium. If one takes into account that muscle tonus is highly dependent on the vestibular apparatus one may understand why the test results of this patient fall into the group of those clinically characterized by symptoms expressed in the realm of neuromuscular

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7 (Contd) in practically all his responses erroneously a J or H or D and sometimes all three without being in the least aware of the connection. It almost looked as if the patient in his grandiosity would have spread his name all over the place.

activity.

There are several further points of interest about the test results of the patients with perseveration. Because of the small number of cases it does not seem profitable to enter into discussion of these additional points. Further testing of additional cases with disturbances in the neuromuscular system--particularly convulsions, ticks and stuttering--is strongly indicated.

IV. Indications for further study.

Our experience with the technique described in this study indicates the desirability of further research. The evidence so far gives definite promise that this technique can be developed into a very useful tool for personality diagnosis as well as into a valuable aid for the diagnosis of various types of personality disorders.

There are many indications for further study. Here only a few of those problems are mentioned which seem to be most necessary and promising.

In order to increase the value of the test a certain amount of further work of standardization and validation would be necessary.

1) It would be important to establish normal standards for both sexes and for the various age groups.

We know already that age influences the speed of reaction, but lacking adequate standards one cannot yet account accurately for the age factor in evaluating the test results. Age may influence also the accuracy of perception and possibly also the consistency and changeability of method applied by the subject in the solution of the task. If we possessed normal standards for age groups the rigidity or looseness of personality organization could be more accurately determined from the test results.

2) Certain features of the test are apparently related to the intelligence level. Correlations between test results and intelligence level as determined by the common psychometric procedures should be made. The information thus obtained would be useful from two points of view. First, it would show whether and to what extent our test measures intelligence. Secondly, and this is more important, in evaluating the test results and in diagnosing personality we would be able to make proper allowance for the intelligence factor.

3) For validation of the test, comparisons and correlations with other personality tests could be made. The Rorschach Test and a test measuring aspiration level would perhaps be most useful for comparison.

4) A further method of validation would consist in correlating our test results with the ratings of persons

who are rather well acquainted with the subjects. It would not be difficult to construct a rating scale consisting of those traits which this test is assumed to measure.

5) The problem of perseveration described in the past section and its remarkable correlation with clinical symptoms in the field of neuromuscular activity is most intriguing and further study would be well worth while. A sufficiently large group of patients suffering from epilepsy, speech defects (such as stuttering), tics and other neuromuscular symptoms would be the best suited subjects for such a study.

Appendix 1.

First Series of Letter Combinations*

1.
F
K X
B J

2.
W
N R
H

3.
H
N Y
W M
R

4.
C
P T
D L
V

5.
V
P D
Z C

6.
J
X B
K

7.
F
Z C
P

8.
R
X Y
M S

9.
S
X F
Z H
C

10.
T
W N
L H

11.
P
N K
W R
D

12.
V
D T
L

---

*This series was used for exposure in the first session in both the first and second part of the study.

Appendix 2.

Second Series of Letter Combinations[*]

1.
F
V K
T R

2.
Y
M K
S

3.
B
J T
L W
M

4.
X
C B
Y K
S

5.
P
W B
X V

6.
B
F W
T

7.
K
N Z
L

8.
Z
L C
M H

9.
F
K R
T W
B

10.
D
N F
S Z

11.
Z
F X
B J
K

12.
X
P H
D

---

[*] This series was used in the second session in both the first and the second part of the study.

Appendix 3.

Third Series of Letter Combinations*

1.
F
V K
T R

2.
W
N R
H

3.
B
J T
L W
M

4.
C
P T
D L
V

5.
P
W B
X V

6.
J
X B
K

7.
K
N Z
L

8.
R
X Y
M S

9.
F
K R
T W
B

10.
T
W N
L H

11.
Z
F X
B J
K

12.
V
D T
L

---

* This series was used in the third session of the first part of the study. It was omitted in the second part of the study.

Appendix 4.

Practice Cards*

1.

M

V B

L

2.

T

X P

M S

3.

R

T B

C

4.

R

V Y

H Z

---

* This series was used for practice in the second part of the study only .

Appendix 5

Recording Sheet

Name ______________ Date ______________ Session No. ______________

Exp.	Resp.	N.O.	N.S.	S	N.E.	I.L.	P	Pd	Pcc.	Pr	Pg	P.i	Remarks
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
Total													

TE ______________

O/TE ______________

US/TS ______________

L. cons. ______________

P. cons. ______________

Appendix 5a

Key to the Abbreviations used in the Recording Sheet.

Exp. -- Exposure
Resp. -- Response
N.O. -- Number of omissions
N.S. -- Number of substitutions
S -- Substitution (The wrongly reported letter is recorded)
N.E. -- Total number of errors
I.L. -- Initial letter
P -- Pattern
Pc -- Clockwise pattern
Pcc -- Contraclockwise pattern
Pr -- Reading pattern
Pg -- Grouping pattern
P.i. -- Irregular pattern
TE -- Total number of errors
O/TE -- Omission/Total Error
US/TS -- Uncommon substitution/Total substitution
L. cons.- Letter consistency index
P. cons.- Pattern consistency index

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Abstract

In this study a new technique for personality diagnosis is presented. The basic assumption is that personality differences can be detected even at the level of perceptual functions.

The experiments consisted in a short time exposure of various letter combinations by means of a Dodge tachistoscope. Letter combinations from 4-6 letters were used, the letters being arranged in a circle. In each session 12 cards were presented. An exposure time of .5 seconds was used for each card. In the first part of the study 3 sessions were held with thepatients, in the second part only 2 sessions.

The following group of subjects were examined:

Normal Controls	31
Schizophrenic Patients	49
Psychiatric Outpatients (Psychoneurotics)	112
Total	192

The study consists of two parts:

1. A comparison of the test results of schizophrenic and normal subjects.

2. The analysis of the responses of a group of psychoneurotic patients.

Part I.

A number of variables have been statistically evaluated:

1. Analysis of Errors. Two types of errors were distinguished.

Omissions, that is reporting fewer letters than presented.

Substitutions, that is reporting letters differing from the exposed ones.

A. The sum of the omissions and substitutions constitutes the total number of errors. Schizophrenic and normal subjects were found to differ significantly from each other with regard to the total number of errors, the mean for the three sessions for the normal controls being 33.8, for the patients, 60.7.

B. The schizophrenic patients and the normal subjects as groups were found to differ from each other significantly also with regard to the kind of substitutions they made. The substitution errors were divided into common and uncommon ones. The patients as a group showed a distinct tendency to make more uncommon substitutions than the normal subjects did.

While the schizophrenic patients and the normal subjects differed from each other with regard to the total number of errors and the kind of substitutions they made, the remaining variables differentiated two types within the schizophrenic group itself.

C. The percentage of omissions and substitutions among all the errors has been calculated. It was found that the schizophrenic and normal control subjects did not differ significantly, considering only the means of the groups. In both groups approximately 70% of the errors were omissions and 30% were substitutions, but there was a marked difference in the type of the distribution. While in the control group the majority of cases **fall** in the middle ranges, the values of the patients tended to cumulate at the end of the distribution so that among the schizophrenics in a relatively large number of cases there was an unusually high percentage of substitutions and in a great number of cases there was a very high percentage of omissions. Since the mean value of the patients was obtained by blending very high and very low values this mean cannot be regarded as characteristic of the schizophrenic patient.

2. The Letter Consistency Index. The letters on the exposure cards were arranged in a circle. The subjects were instructed to write the letters they could remember not in a circle but in a single row. They had the tendency to start more or less consistently with a letter which appeared in a definite position on the exposure card (uppermost, left upper, etc.). The consistency with which the subject adhered to ~~her~~ his preferred method was calculated. It was measured by the "letter consistency index" which expresses in percentage the degree of preference.

Both schizophrenic and normal subjects were rather consistent in this respect.

Here again we found a somewhat greater frequency of extreme values in the schizophrenic group than in the control group.

3. Pattern Consistency Index. In reproducing the exposed letters the subjects tended to follow certain personally preferred patterns of sequence (clockwise, contraclockwise, etc.). The consistency with which the subject adhered to his preferred pattern has been calculated. The ratio of the number of responses with the preferred pattern to the total number of responses was called the "pattern consistency index".

The means of the patients were again not significantly different from those of the controls. The frequency distribution of the patients showed very distinctly the previously mentioned peculiarity. The patients were either extremely consistent or extremely inconsistent; thus the intermediate values were found less frequently than among the normal controls.

In the results obtained in the first part of the study two points were outstanding:

> The schizophrenic patients (a) made many more errors than the controls, and (b) their substitution errors were of an unusual type. The former indicates a reduced speed of reaction, the latter probably a tendency of the schizophrenic

patient to distort reality in phantastic ways.

While the above mentioned features distinguished schizophrenic and normal subjects the remaining three variables (the percentage of substitutions and omissions among the errors, the letter consistency and pattern consistency index) differentiated two groups among the schizophrenic patients. High percentage of omission errors with high consistencies was interpreted as a sign of obsessional accuracy and pedantry which are marks of a rigid personality. Patients with such test results belonged mostly to the paranoid subtype of schizophrenia. High percentage of substitution errors and low consistency were interpreted as signs of a loosely organized personality, showing inconsistent behavior and little respect for the objective reality. Patients showing such results belonged prevalently to the hebephrenic subtype.

Part II.

The second part of the investigation was carried out under the direction of Dr. N. D. C. Lewis at the Vanderbilt Clinic in New York. One hundred twelve psychiatric outpatients were examined.

In addition to the five variables discussed in the first part, several other features were also scrutinized

in evaluating the test results of this latter group of patients.

With respect to their test results the patients fell into four groups.

Group I. Outstanding feature: rigidity.

These patients were extremely methodical, showing very high consistency indices.

They were overcautious. This showed itself in the very small number or complete absence of substitution errors.

They manifested a "shock" when confronted with an unexpected difficult task on which occasion they worked far below their actual capacity.

Often they showed a low level of aspiration apparently being afraid of making mistakes.

All these features contributed to increase the total number of errors far beyond what the patient could have accomplished under optimal conditions.

Clinically the patients belonging to this group showed one or the other of the following conditions:

Obsessive compulsive neurosis;

Excessive worry over a physical illness or deformity;

Certain psychosomatic diseases such as peptic ulcer, asthma, various skin conditions, etc.

Group II. Outstanding feature: signs of loose personality organization. The test results of the patients in this group showed the following outstanding characteristics:

Low pattern consistency, indicating unsystematic haphazard way of reaction;

An increased number of substitution errors which indicates lack of accuracy and a diminished power of environmental stimuli to guide the patient's behavior.

Both these features suggest the loosening of personality organization.

There was a marked unevenness in the patient's responses. Often very good responses alternated with extremely poor ones. This was interpreted as a sign of an acute "endogenous" emotional disturbance.

Clinically, the patients in this group are characterized by acute anxiety and tension. The patients in this group belonged in two diagnostic categories, acute tension states and anxiety hysteria. In cases of hysteria only those patients showed markedly the signs of disorganization in whom free anxiety was the outstanding feature. In pure conversion hysteria the test results were similar to those found in Group I.

Group III. Outstanding feature: high total number of errors. Among the patients tested there was a group with a very high number of errors. This feature set them apart

from all the other patients examined.

Clinically, the following three features were outstanding in these patients:

They belonged on the whole to an older chronological age group.

Several of the patients of this group had a definitely lower than average intelligence.

A large percentage of the patients in this group were suffering from various types of depression (Involutional Syndrome, Reactive Depression).

Since in the majority of these cases more than one of the above mentioned clinical characteristics were present, it was not possible to estimate accurately to what extent each of these features--low intelligence, age and depressed mood--contributed to the reduced speed of reaction.

Group IV. Outstanding feature: perseveration. In these patients there was a marked tendency towards perseveration of letters from one response into the succeeding ones. This feature clearly differentiated these patients from all other patients studied because in general the successive responses have no detectable influence upon each other.

It was striking that all these patients showed some neuromuscular disturbance. These symptoms were interpreted

by the physician in some cases as of organic origin but in the majority of cases they were found to be of psychogenic origin. These symptoms were convulsions (epileptic and hysterical), tics, and stuttering. The relationship between perseveration in the test and neuromuscular symptoms is not fully understood. The relationship, however, is very striking. It is felt that it has considerable diagnostic significance.

The results obtained in this study indicate the desirability of further research. The technique which has been described may be developed into a tool for personality diagnosis as well as into an aid for the diagnosis of various types of personality disorders.

Norms for both sexes and various age groups could be established. So far the test results were compared with the psychiatric descriptions of the patients. Comparisons with the results of various personality tests and with ratings of the subjects would help further to validate this technique.

Autobiography.

I was born January 21, 1907 in Vienna, Austria. My parents are Bernhard Fellner and Bertha Glückselig, both born in Austria.

I went to school in Vienna and received a teacher's diploma for foreign lanugages(French) in 1925. In 1931 I finished my studies at the Bundesrealgymnasium Mödling and received a certificate (Matura) which permitted the student to enroll at any faculty in European Universities. I continued my studies at the Royal University of Turin, Italy, frequenting courses in philosophy, psychology and art. In 1932 I came with my husband, Dr. Andras Angyal who had received a Rockefeller fellowship ,to America where I have been living since. I became a citizen of the U.S.A, in 1940. I have been a graduate student at Yale University in 1932-33. I received the Master's degree in Psychology in June 1939 from Boston University and continued my graduate studies at B.U. I did research work for several years at the Worcester State Hospital and for one year at the New York State Psychiatric Institute, N.Y.

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